TOSHIBA
Leading Innovation

UNINTERRUPTIBLE POWER SYSTEM (UPS)

4200*FA*

INSTALLATION AND OPERATION MANUAL

Three-Phase 15/25/30/50 kVA UPS

Doc. No.: 53878-013

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4200*FA*

INSTALLATION AND OPERATION MANUAL

Three-Phase 15/25/30/50 kVA UPS

FOR all 15 – 50 kVA MODELS WITH TOUCHSCREEN INTERFACE:

TOSHIBA INTERNATIONAL CORPORATION
INDUSTRIAL DIVISION
13131 West Little York Road
Houston, TX 77041-9990

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NOTICE

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QUALIFIED PERSONNEL ONLY

Qualified Personnel are those who have the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and have received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

UNINTERRUPTIBLE POWER SYSTEM

If additional information or technical assistance is required call TOSHIBA Customer Support Center toll free at 1- 877-867-8773, or write to: Toshiba International Corporation, 13131 West Little York Road, Houston, TX 77041-9990 Attn: UPS Product Manager.

Please complete the following information for your records. Unless otherwise specified on the warranty card, the warranty period for the UPS or UPS part is 36 months from the shipment date (see bill of lading).

Unless otherwise specified on the warranty card, the warranty period for a UPS battery is 24 months from the shipment date (see bill of lading).

Keep this manual with the UPS equipment.

Job Number:_____

Model Number: _____

Serial Number:_____

Application:_____

Shipping Date:_____

Date of Installation:_____

Inspected By:_____

Purpose and Scope of Manual

This manual provides information on how to safely install, operate, and maintain your TOSHIBA power electronics product. This manual includes a section on General Safety Instructions that describes the warning labels and symbols that are used throughout the manual. Read the manual completely before installing, operating, or performing maintenance on this equipment.

This manual and the accompanying drawings should be considered a permanent part of the equipment and should be readily available for reference and review. Dimensions shown in the manual are in metric and/or the English equivalent.

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Contacting TOSHIBA Customer Support Center

The TOSHIBA Customer Support Center can be contacted to obtain help in resolving any **Uninterruptible Power System** problem that you may experience or to provide application information.

The center is open from 8 a.m. to 5 p.m. (CST), Monday through Friday. The Support Center's toll free number in USA is (877) 867-8773.

You may contact TOSHIBA by writing to:

TOSHIBA INTERNATIONAL CORPORATION.

INDUSTRIAL DIVISION

13131 West Little York Rd.

Houston, TX 77041-9990

Attn: UPS Product Manager

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1 GENERAL SAFETY INSTRUCTIONS

DO NOT attempt to install, operate, maintain or dispose of this equipment until you have read and understood all of the product safety information and directions that are contained in this manual.

Safety Alert Symbol

The **Safety Alert Symbol** indicates that a potential personal injury hazard exists. The symbol is comprised of an equilateral triangle enclosing an exclamation mark.

Signal Words

Listed below are the signal words that are used throughout this manual followed by their descriptions and associated symbols. When the words **DANGER**, **WARNING** and **ATTENTION** are used in this manual they will be followed by important safety information that must be carefully adhered to.

Warnings in this manual may appear in any of the following ways:

1) *Danger warning* – The danger symbol is an exclamation mark enclosed in a triangle, which precedes the word "DANGER." The Danger warning symbol is used to indicate situations, locations, and conditions that exist and will cause serious injury or death.

DANGER

2) *Caution warning* – The caution symbol is an exclamation mark enclosed in a triangle, which precedes the word "CAUTION." The Caution warning symbol is used to indicate situations and conditions that can cause operator injury and/or equipment damage.

CAUTION

3) *Attention warning* – The attention warning symbol is an exclamation mark enclosed in a triangle which precedes the word "ATTENTION." The Attention warning symbol is used to indicate situations and conditions that can cause operator injury and/or equipment damage.

ATTENTION

Other warning symbols may appear along with the *Danger* and *Caution* symbol and are used to specify special hazards. These warnings describe particular areas where special care and/or procedures are required in order to prevent serious injury and possible death.

1) *Electrical warning* – The electrical warning symbol is a lighting bolt enclosed in a triangle. The Electrical warning symbol is used to indicate high voltage locations and conditions that may cause serious injury or death if the proper precautions are not observed.

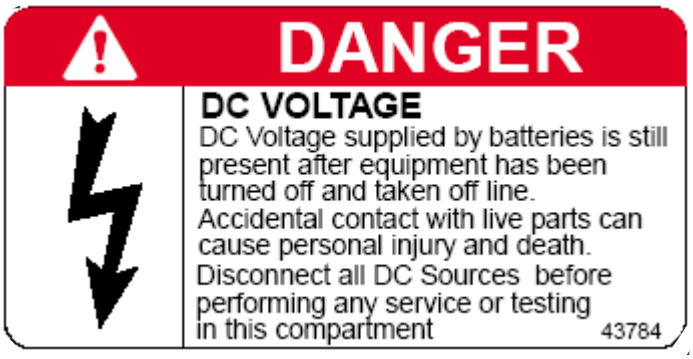
2) *Explosion warning* – The explosion warning symbol is an explosion image enclosed in a triangle. The Explosion warning symbol is used to indicate locations and conditions where molten exploding parts that may cause serious injury or death if the proper precautions are not observed.

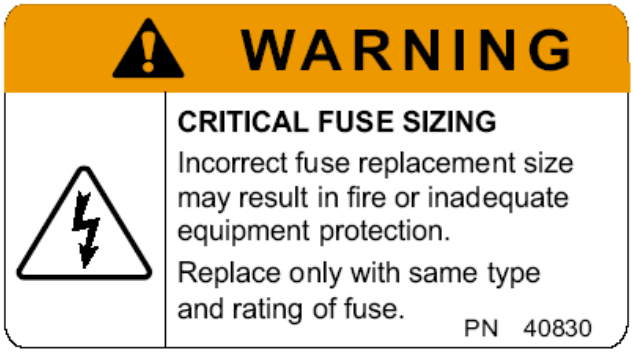
1.1 EQUIPMENT WARNING LABELS

DO NOT attempt to install, operate, maintain or dispose of this equipment until you have read and understood all of the product warnings and user directions that are contained in this instruction manual.

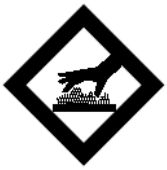
Shown below are examples of warning labels that may be found attached to the equipment. **DO NOT** remove or cover any of the labels. If the labels are damaged or if additional labels are required, contact your TOSHIBA representative for additional labels.

The following are examples of the warning labels that may be found on the equipment. The labels are there to provide useful information or to indicate an imminently hazardous situation that may result in serious injury, severe property and equipment damage, or death if the instructions are not followed.


DANGER
DC VOLTAGE
DC Voltage supplied by batteries is still present after equipment has been turned off and taken off line.
Accidental contact with live parts can cause personal injury and death.
Disconnect all DC Sources before performing any service or testing in this compartment
43784


WARNING
CRITICAL FUSE SIZING
Incorrect fuse replacement size may result in fire or inadequate equipment protection.
Replace only with same type and rating of fuse.
PN 40830

CAUTION



Hot surface.

Contact may result in burn injury.

Allow equipment to cool before servicing.

PN 40832

DANGER

RISK OF ELECTRIC SHOCK
Capacitors stay charged after power has been shut off.
Accidental contact with live parts can cause personal injury and death.
Turn off and lock out all power sources. Wait at least five (5) minutes for power to dissipate then check voltage before servicing.

39561

CAUTION

Risk of electrical shock.
Battery circuit is not isolated from AC input, hazardous voltage may exist between battery terminals and ground.
Test circuit before touching.

PN 40760

DANGER

HAZARDOUS VOLTAGES
Hazardous voltages are used in the operation of this equipment and could cause severe personal injury or loss of life.
The following precautions should be observed to reduce the risk of injury or death.

Only qualified technicians familiar with this equipment and the information supplied with it should be permitted to install and operate this equipment.

Installation of electrical equipment must be done in accordance with National Electrical Code and any other state or local codes. Proper grounding and conductor sizing must be installed for safe operation.

During operation, keep all covers in place and cabinet doors shut.

When performing visual inspections and maintenance, if possible, be sure the UPS is turned off and the incoming AC feed is turned off and locked out.
The UPS and Battery Cabinet will have hazardous voltages present even after the AC feed is turned off.

If it is necessary to make measurements with the power on, do not touch any electrical connection points. Remove all jewelry from wrists and fingers. Make sure test equipment is in good, safe operating condition.

While servicing, stand on some type of insulation, and be sure not to be grounded.

Follow the safety instructions given in the equipment manual carefully and observe all danger, warning and caution notices.

40308

CAUTION

Heat sink not grounded.

Risk of electrical shock.

Disconnect UPS and electrically test heat sink before touching.

PN 40831

CAUTION - Risk of electric shock

DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

HAZARDOUS LIVE PARTS INSIDE THIS UPS ARE ENERGIZED FROM THE BATTERY SUPPLY EVEN WHEN THE INPUT AC POWER IS DISCONNECTED.

CAPACITORS STORE HAZARDOUS ENERGY. DO NOT REMOVE COVER UNTIL 5 MINUTES AFTER DISCONNECTING ALL SOURCES OF SUPPLY.

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, INSTALL IN A TEMPERATURE AND HUMIDITY CONTROLLED INDOOR AREA FREE OF CONDUCTIVE CONTAMINANTS.

ATTENTION

EN CAS D'UTILISATION EN ATMOSPHERE CONTROLEE. CONSULTER LA NOTICE TECHNIQUE.

BATTERY BACK-UP TIME, WHICH WAS FACTORY-SET AT A PREDETERMINED LEVEL, DECREASES GRADUALLY BETWEEN SERVICE PERIODS. THE BATTERIES SHOULD BE REPLACED EVERY THREE YEARS AFTER THE LAST SERVICING, THE DATE OF WHICH IS WRITTEN ON THE ID PLATE LOCATED ON THE REAR SIDE OF THE UPS UNIT, OR IN THE BOX BELOW.

DATE OF LAST BATTERY CHARGE:

PN 41750

NOTE: This Label for Battery Units Only

1.2 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions that should be followed during the installation, maintenance, and operation of the UPS and its batteries to assure safe and proper operation

1. Turn off, lockout, and tagout all power sources before connecting the power wiring to the equipment or when performing maintenance.
2. Hardwire type UPS units are not equipped with an over-current protection device, nor do they have an output disconnect for the ac output. Therefore, a user-installed circuit breaker should be provided between the UPS output and the load input.
3. Battery servicing should be performed by a qualified TOSHIBA Representative only.
4. Unauthorized personnel should not service batteries.
5. Contact your nearest TOSHIBA authorized service center for battery replacement.

Qualified Personnel ONLY!

Qualified Personnel is one that has the skills and knowledge relating to the construction, installation, operation, and maintenance of the electrical equipment and has received safety training on the hazards involved (Refer to the latest edition of NFPA 70E for additional safety requirements).

Qualified Personnel shall:

1. Have read the entire operation manual.
2. Be trained and authorized to safely energize, de-energize, ground, lockout and tag circuits and equipment, and clear faults in accordance with established safety practices.
3. Be trained in the proper care and use of protective equipment such as safety shoes, rubber gloves, hard hats, safety glasses, face shields, flash clothing, etc., in accordance with established safety practices.
4. Be trained in rendering first aid.
5. Be knowledgeable of batteries and the required handling and maintenance precautions.

For further information on workplace safety visit www.osha.gov.

Refer to the Battery System Manual for details on operating and maintaining the battery units for each system.

A circuit breaker should be provided by the user between the UPS output and the critical load input because the UPS System's output is not equipped with an over-current protection device, or an output disconnect for the AC output. The suggested current rating for the UPS output circuit breaker should be as follows:

Table 1.1 Recommended Over-Current Protection

	15 kVA	25 kVA	30 kVA	50 kVA
Rated Output	**Rating**	**Rating**	**Rating**	**Rating**
208/120 VAC	240 V, 60 A	240 V, 90 A	240 V, 110 A	240 V, 175 A
220/127 VAC	240 V, 50 A	240 V, 90 A	240 V, 100 A	240 V, 175 A

	15 kVA	25 kVA	30 kVA	50 kVA
Rated Output	**Rating**	**Rating**	**Rating**	**Rating**
240 VAC	240 V, 45 A	240 V, 80 A	240 V, 90 A	240 V, 150 A
380/220 VAC	480 V, 30 A	480 V, 50 A	480 V, 60 A	480 V, 100 A
480/277 VAC	480 V, 25 A	480 V, 40 A	480 V, 45 A	480 V, 80 A
600 VAC	600 V, 20 A	600 V, 30 A	600 V, 40 A	600 V, 60 A

The maximum ambient temperature in which the Uninterruptible Power System (UPS) should be operated is 104 °F (40 °C) without batteries and 89 °F (32 °C) if the battery cabinet is subject to the same ambient temperature as the UPS. The nominal battery voltage for all internal battery models is 288 VDC. The nominal battery voltage for all external battery models is 288 VDC.

An Authorized TOSHIBA Representative who is knowledgeable of batteries and the required precautions should perform service on the batteries. Keep unauthorized personnel away from batteries.

Refer to the Battery System Manual when scheduling battery maintenance or battery replacement.

DANGER Misuse of this equipment could result in injury and equipment damage. In no event will TOSHIBA be responsible or liable for direct, indirect, or consequential damage or injury that may result from the misuse of this equipment.

CAUTION

Do not dispose of the batteries in a fire. The batteries may explode.

CAUTION Do not open or mutilate the batteries. Released electrolyte is toxic and harmful to the eyes and skin.

CAUTION This unit contains sealed lead acid batteries. An annual preventative maintenance should be performed by an authorized technician.

Failure to do so could result in batteries exploding and emitting gasses.

CAUTION Do not open or mutilate the batteries. Released electrolyte is toxic and harmful to the eyes and skin.

WARNING Failure to replace a battery before it becomes exhausted may cause the case to crack, possibly releasing electrolytes from inside the battery, and resulting in secondary faults such as odor, smoke, and fire.

WARNING Only personnel knowledgeable of batteries and the required precautions should perform installation and servicing of batteries. Keep

Unauthorized personnel away from the batteries.

WARNING A qualified service technician must do proper maintenance to the battery system of this unit. This is essential for the safety and reliability of your UPS system. Refer to service manual.

DANGER ***A battery can present a risk of electrical shock and high short circuit current.***

The following precautions should be observed when working with batteries.

1. Verify that the "UPS" is off and that the Input Circuit Breaker is in the off position.
2. Remove watches, rings, jewelry, or other metal objects.
3. Use tools with insulated handles to prevent accidental shorts.
4. Wear rubber gloves and boots.
5. Do not lay tools or metal parts on top of batteries.
6. Determine if the battery is grounded. If grounded, remove source of the ground.

Contact with any part of a grounded battery can result in an electrical shock.

7. Electrical shock will be reduced if grounds are removed during installation and maintenance.
8. Verify circuit polarities prior to making connections.
9. Disconnect charging source and load prior to connecting or disconnecting terminals.
10. VRLA batteries contain an explosive mixture of hydrogen gas. Do not smoke; create a flame or a spark in the immediate area of the batteries. This includes static electricity.
11. Do not attempt to open the batteries in order to add water or sample the specific gravity of the electrolyte. The batteries are valve regulated lead acid type and such servicing is not possible without damaging the battery.
12. Use proper lifting means when moving batteries and wear all appropriate safety clothing and equipment.
13. Dispose of lead acid batteries through proper channels in accordance with Local, State and Federal EPA Regulations.

To be performed by **Qualified Personnel** only.

1. Verify that the UPS is off and that the power cord is disconnected from the power source.
2. Remove watches, ring, jewelry, or other metal objects.
3. Use tools with insulated handles to prevent inadvertent shorts.
4. Wear rubber gloves and boots.
5. Do not place tools or any metal parts on top of batteries.
6. Determine if the battery is inadvertently grounded. If inadvertently grounded, remove source of ground.

Contact with any part of a grounded battery can result in electrical shock.

The likelihood of shock will be reduced if such grounds are removed prior to installation or maintenance.

2 INSTRUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ

CONSERVER CES INSTRUCTIONS

Cette notice contient des instructions importantes concernant la sécurté

ATTENTION Un battery puet présenter un risque de choc électrique, de brûlure par transfert d' énergie.

ATTENTION L'élimination des batteries est règlementèe. Consultar les codes locaux à cet effet

3 Product Description

This manual covers all current variants of the 4200FA Series 15-50 kVA UPS. All variants of each capacity supply the same rated power and performance. The differences are listed below:

- **4200FA Base Model** – Basic version of 15-50kVA sizes, mounted on two C-channel skids, no integral maintenance bypass switch, no lockable On/Off switch, and no redundant dry contact terminal switch, and optional internal batteries.
- **4200FA Premium Model** – Base model plus casters, integral maintenance bypass switch (MBS), lockable On/Off switch, and optional either internal batteries or transformer(s),.
- **4200FA Seismic Certified** – Base model plus integral maintenance bypass switch (MBS), lockable On/Off switch, and optional internal transformer(s). The 50kVA unit has three C-channel skids.

3.1 Theory of Operation

An Uninterruptible Power Supply (UPS) is a system that is installed between the commercial power and the critical load. The UPS provides steady AC output power during commercial power fluctuations and interruptions.

During “Normal Operation” the UPS utilizes commercial AC power and removes high voltage spikes, and transients caused by switching or faults on the utility. The result of this process is maximum power conditioning and regulation.

If the AC power supplied to the UPS drops below a specified voltage level, the unit's batteries automatically begin supplying power instead of receiving it. This insures that the loads connected to the UPS continue to receive power without interruption. This power is provided for a long enough time so that the load can be shut down in an orderly fashion. This prevents loss of data and possible damage to both hardware and software.

When the AC input power becomes available again, the operation returns to normal and the batteries begin to recharge for the next power interruption.

3.2 Application and Use

The TOSHIBA 4200*FA* On-Line, Uninterruptible Power Systems (UPS) provide continuous computer grade isolated AC power in a compact, efficient, high performance unit. The UPS assures safe, reliable operation of critical office equipment, ranging from personal computers to mini-computers to local area networks (LAN).

All units feature an audible alarm that sounds if the battery voltage drops below the standard during use. This is an additional aid to help in retaining valuable data and equipment. All units are capable of interfacing to a computer network.

3.3 Power Backup

During an electrical power failure the UPS batteries automatically supply DC power to the inverter that supports the load equipment, without interruption. For example, when used to support a computer, the UPS’s back up assures additional time to complete your activity, store data and initiate an orderly shutdown after a power failure occurs.

3.4 Power Conditioning

While commercial power is present, the UPS supplies conditioned power to the load while maintaining its batteries in a charged condition.

The UPS protects the connected load against the normal, everyday problems associated with heavy use of raw commercial power, including power sags, surges, signal interference, and spikes.

In addition, the models with transformers provide total isolation to reduce the common and normal mode noises. This adds further protection to keep power-line problems from reaching your load, where it can cause equipment to operate erratically, or damage hardware and software.

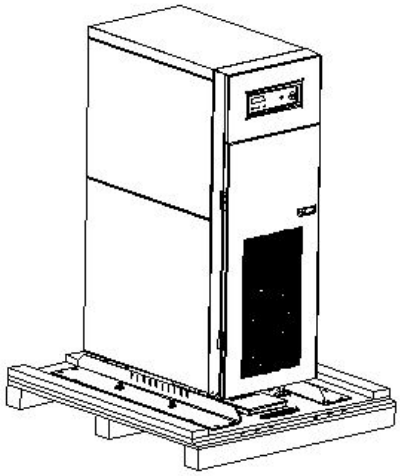
4 Product Unpacking / Inspection / Storage / Disposal

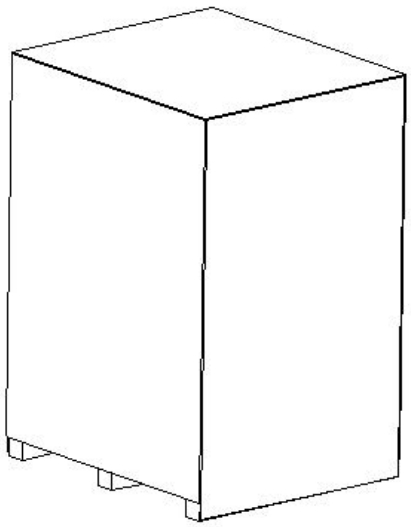
4.1 Unpack the Premium 15/25/30 kVA UPS (with Casters)

(EXCLUDING Seismic and Base versions – See 4.2)

Carefully inspect the UPS for shipping damage. Units shipped within North America and NAFTA are shrink wrapped.

1. Remove shrink wrap.





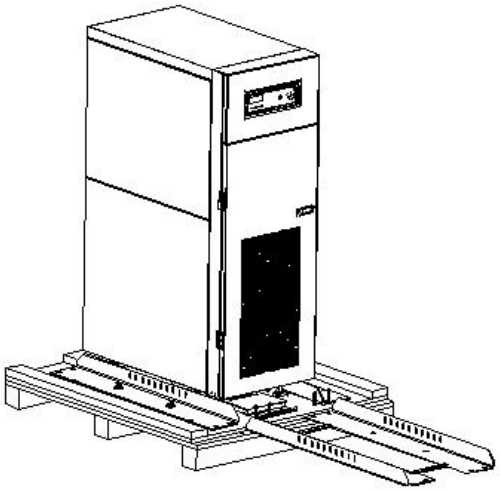
2. Unbolt the rails from both the unit and the shipping pallet.

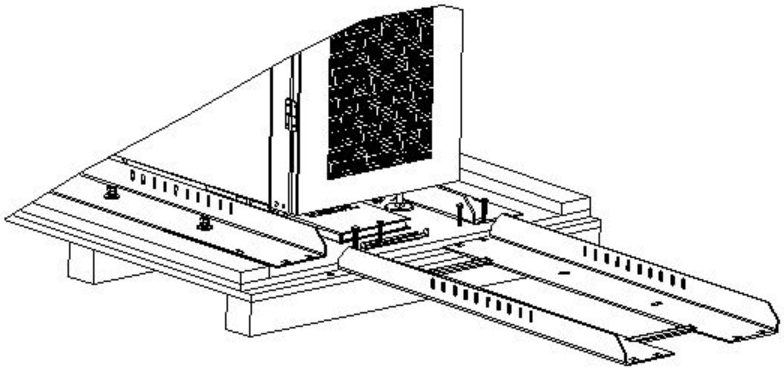
   Place the rails on the front of the pallet.

   Use the four 1/2 x 3" bolts to secure the rails to the shipping pallet.

   Attach the rails as shown to the front of the pallet.

3. Place the tie brackets in the slots at the lower end of the ramps. SLOWLY roll the unit down the ramp.





4. Save the loading rails for seismic anchoring of the UPS. See pg. 14.

DANGER

TOP HEAVY EQUIPMENT – DO NOT tilt the UPS more than 10° from the upright position.

Tilting the UPS more than 10° may cause crushing, trapping, or other personal injuries and cause physical damage to internal components.

THIS EQUIPMENT WILL TIP OVER EASILY UNTIL FIXED IN PLACE.

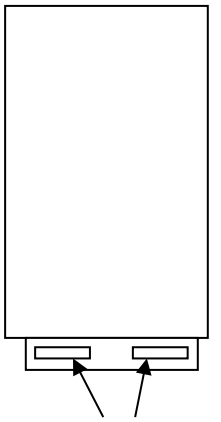
4.2 Unpack the Base and Seismic model 15/25/30 kVA UPS (without Casters)

- **(4200FA Base, P/N C42F3FnnnXAXXN and C42F3FnnnXAXBN)**
- **(4200FA Seismic, P/N C42F3F250XAMX0S)**

Carefully inspect the UPS for shipping damage. Units shipped within North America and NAFTA are shrink-wrapped.

1. Remove the shrink wrap from the UPS and Pallet.
2. Unbolt the UPS from the shipping pallet.
3. Use a forklift/pallet jack to lift the UPS off the pallet. Insert the lifting forks through the lifting fork access ports.
4. Use a forklift/floor jack to position the UPS on the pre-drilled mounting holes. See Section 2.7 for hole dimensions and configuration.

Side view of 15/25/30kVA UPS



DANGER

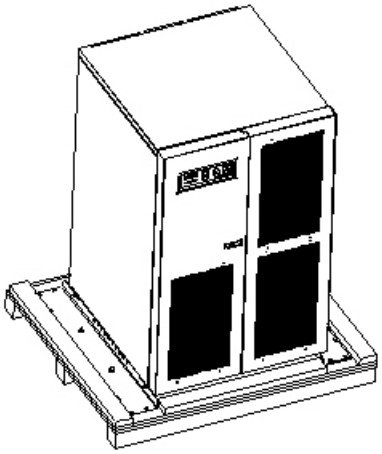
TOP HEAVY EQUIPMENT – DO NOT tilt the UPS more than 10° from the upright position.

Tilting the UPS more than 10° may cause crushing, trapping, or other personal injuries and cause physical damage to internal components.

4.3 Unpack the Premium 50 kVA UPS (with Casters)

(EXCLUDING Seismic and Base models – See Section 4.4)

Carefully inspect the UPS for shipping damage. Units shipped within North America are shrink-wrapped; those outside North America are crated.



1. Remove shrink wrap material.

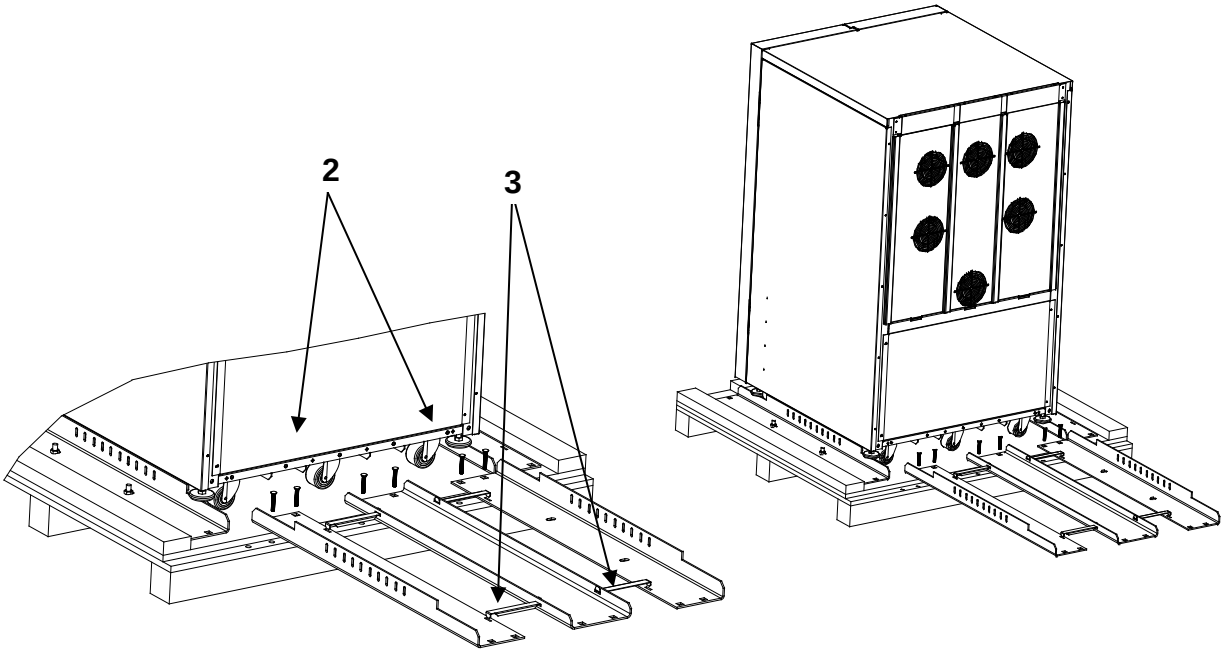
2. Unbolt the rails from both the unit and the shipping pallet.

   Place the rails on the front of the pallet.

   Use the four 1/2 x 3" bolts to secure the rails to the shipping pallet.

3. Place the tie brackets in the slots at the lower end of the ramps. SLOWLY roll the unit down the ramp.

4. Save the loading rails for seismic anchoring of the UPS.



DANGER

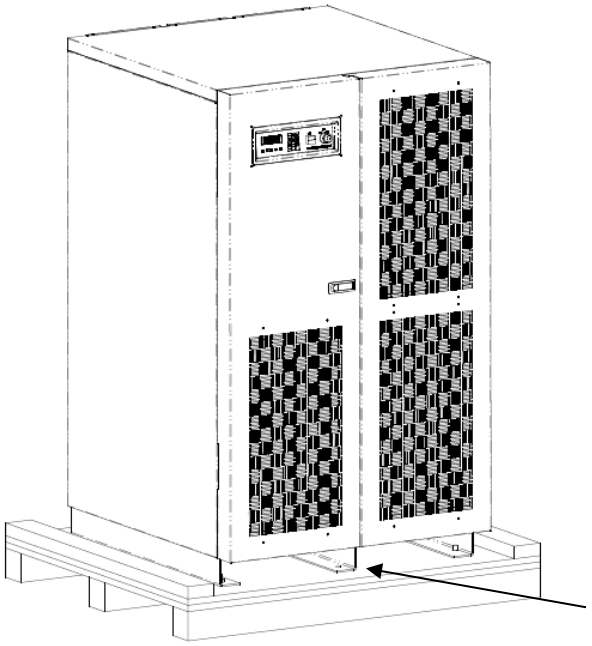
TOP HEAVY EQUIPMENT. IMPROPER LIFTING CAN RESULT IN INJURY OR DEATH. LIFT AND MOVE CAREFULLY AND ONLY WITH ADEQUATE EQUIPMENT AND TRAINED PERSONNEL. THIS EQUIPMENT WILL TIP OVER EASILY UNTIL FIXED IN PLACE.

4.4 Unpack the Base and Seismic 50 kVA UPS (without Casters)

- **4200FA 50kVA Base (P/N T42F3F500XAXXN , T42F3F500XAXBN)**
- **4200FA 50kVA Seismic (P/N T42F3F500XAMX0S)**

Upon receipt of the UPS, a careful inspection for shipping damage should be made. Units shipped within North America and NAFTA are shrink-wrapped; those outside North America are crated.

1. Remove the shrink wrap from the UPS and Pallet.
2. Unbolt the UPS from the shipping pallet.
3. Position the forks between the C-channel feet on the bottom of the 50kVA UPS cabinet. (front or back access)
4. Lift the UPS off the pallet.
5. Use the forklift/floor jack to position the UPS on the pre-drilled mounting holes. See Section 2.7



Seismic Version has two outer and a center C-channel skid
Base Version has two outer C-channel skids but NO center skid

Figure 4-1 Offload 50kVA UPS (No Casters)

DANGER

TOP HEAVY EQUIPMENT – DO NOT tilt the UPS more than 10° from the upright position.

Tilting the UPS more than 10° may cause crushing, trapping, or other personal injuries and cause physical damage to internal components.

THIS EQUIPMENT WILL TIP OVER EASILY UNTIL FIXED IN PLACE.

4.5 Inspect UPS equipment After Unpacking:

Check the unit for loose, broken, bent or other damaged parts. If damage has occurred during shipment, keep all packing materials for return to the shipping agent. The equipment warranty does not apply to units that are damaged during shipment.

Check to see that the rated capacity and the model number specified on the nameplate conform to the order specifications.

4.6 Permanent Anchoring for Premium 15/25/30/50 kVA UPS (with Casters)

Use the shipping rails for permanent anchoring of the castor-equipped 4200FA.

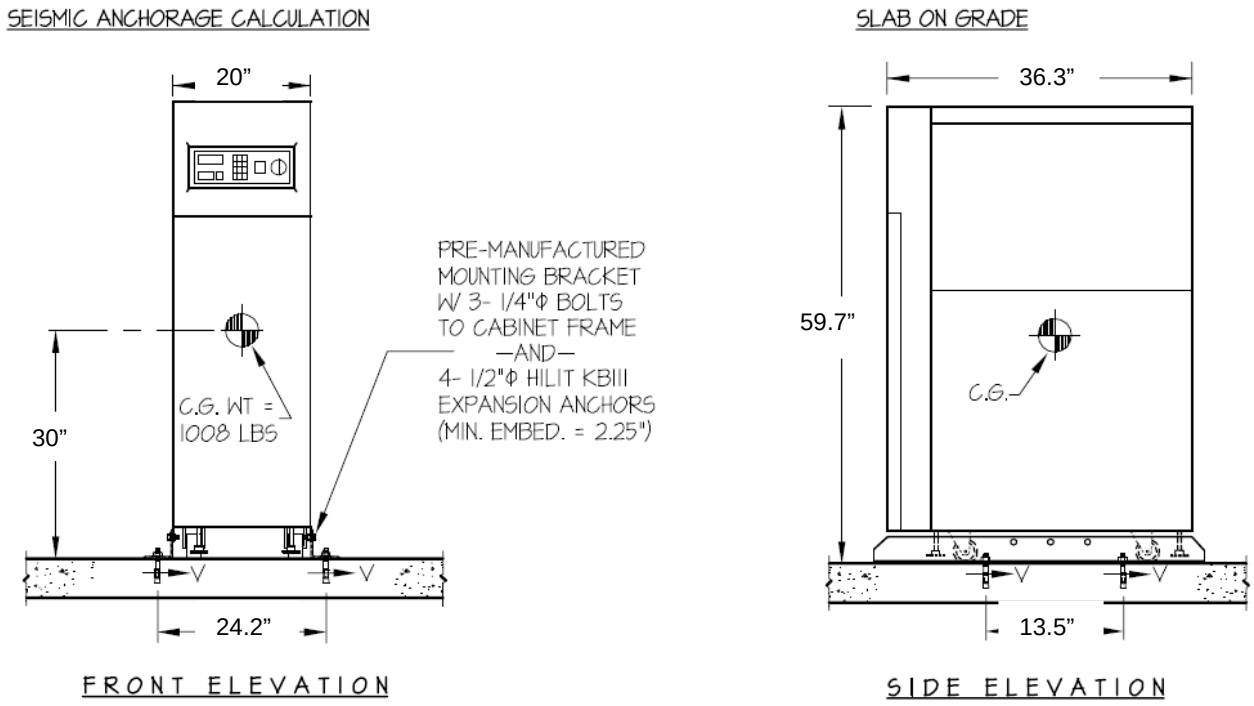


Figure 4-2 Anchoring for 15-30kVA with Casters

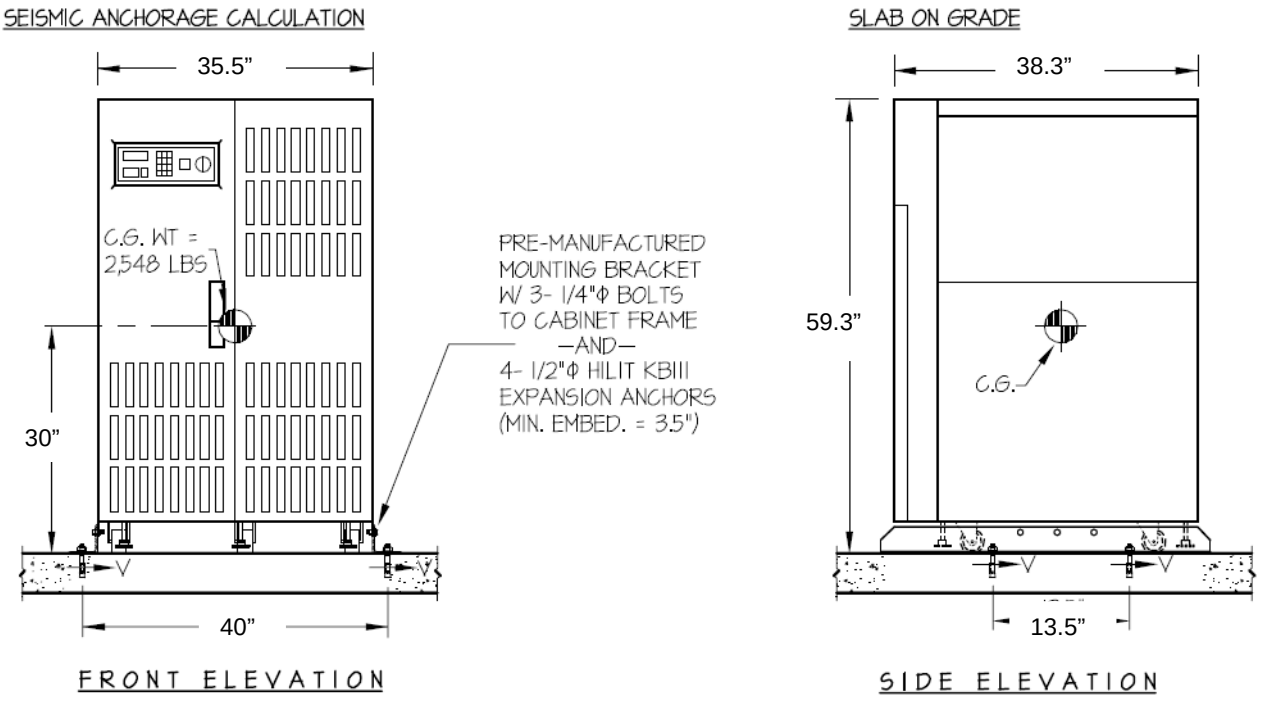


Figure 4-3 Anchoring for 50kVA with Casters

4.7 Permanent Anchoring for Base and Seismic model 15/25/30/50 kVA UPS (without Casters)

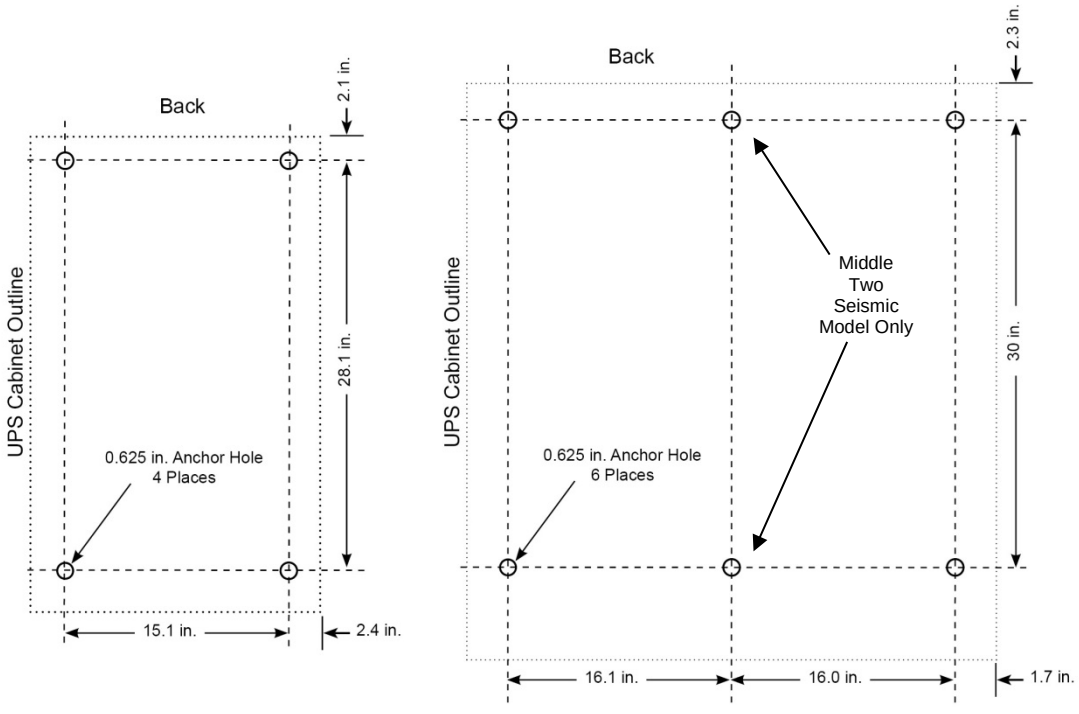


Figure 4-4 Anchoring Pattern for Basic and Seismic 50kVA (C-Channel Feet)

See Appendix A for fastener details.

4.8 Storage of UPS equipment

If the UPS equipment is to be subject to long or short-term storage, the following guidelines should be used.

Avoid:

1) Storage in sites subject to extreme changes in temperature or high humidity.
2) Storage in sites subject to exposure of high levels of dust or metal particles.
3) Storage on inclined floor surfaces or in sites subject to excessive vibration.

Before storing:

1) Charge the system's batteries.
2) Perform a complete system shutdown as described in section 6.15 of this manual.

Storing:

1) Store within a temperature range of - 4 – 104 °F (-20 – 40 °C).
2) For best results, store the UPS in the original shipping container and place on a wood or metal pallet.
3) The optimum storage temperature is 70 °F (21 °C). Higher ambient temperatures cause UPS batteries to need recharging more frequently.
4) If stored in an ambient temperature less than 68 °F (20 °C), recharge the batteries every 9 months.
5) If stored in an ambient temperature of 68 – 86 °F (20 – 30 °C), recharge the batteries every 6 months.
6) If stored in an ambient temperature of 86 – 104 °F (30 – 40 °C), recharge the batteries every 3 months.

4.9 Disposal

Please contact your state environmental agency for details on proper disposal of electrical components and packaging in your particular area.

ATTENTION

It is ILLEGAL to dump lead-acid batteries in landfills or dispose of improperly. Please help our Earth by contacting the environmental protection agencies in your area, the battery manufacturer, or call TOSHIBA toll-free at (877) 867-8773 for more information about recycling batteries.

5 Installation Precautions

Based on the 4200*FA* UPS external dimensions and the way the outer panels are removed; minimum amounts of unobstructed space around the unit are necessary for ventilation and maintenance access. The following section and Fig. 3.1 shows the minimum clearances required for proper UPS site installation.

5.1 Equipment Placement

Do not install the UPS on an inclined surface, or areas that are subject to frequent vibrations or jolting. This could damage UPS circuits.

Do not allow liquids or foreign objects to get inside the UPS.

Allow at least the following spacing for air ventilation and maintenance access.

Front: 20 in. (500 mm)

Sides: 6 in. (152 mm)

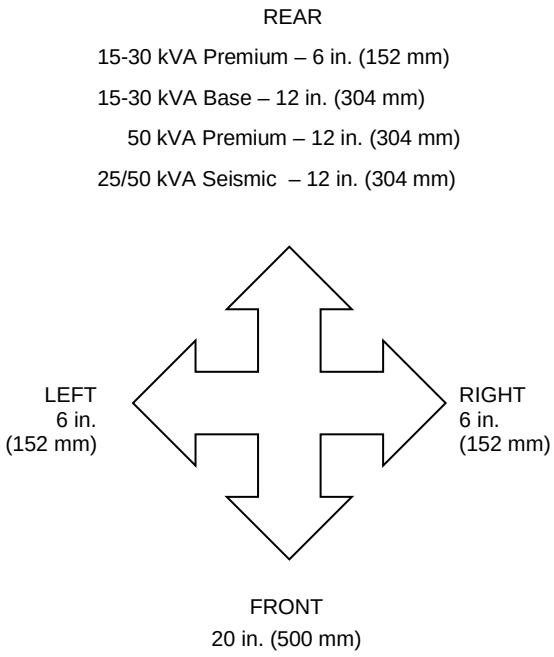
Back:

15-30kVA Premium - 6 in. (152 mm)

15-30kVA Base - 12 in. (304 mm)

50kVA Premium - 12 in. (304 mm)

25/50kVA Seismic - 12 in. (304 mm)



Do not install the UPS in a location that is subject to high humidity. Also, do not install the unit in areas that are exposed to direct sunlight, or contaminated areas subject to high levels of airborne dust, metal particles, or flammable gasses.

Verify the ventilation and air conditioning system at the site is capable of removing the heat generated by the UPS.

Ambient temperature range for operating the UPS is 32 – 104 °F (0 – 40 °C);

77 °F (25 °C) is the recommended operating temperature for maximum battery life.

Avoid installation near sources of electrical noise. Always make sure that the unit's ground is intact to prevent **electrical shock** and help prevent electrical noise.

This UPS generates and radiates radio-frequency energy during operation. Although RFI noise filters are installed inside the unit there is no guarantee that the UPS will not influence some sensitive devices, which are operating in near proximity. If such interference occurs, the UPS should either be installed farther away from the affected equipment and/or powered from a different source than the affected equipment.

5.2 System Preparation (Pre-Power)

Before connecting the UPS to a power source; move the Circuit Breakers (ON/OFF), on the front panel, to the OFF position and move the operation STOP/RUN key switch, on the front panel, to the STOP position.

5.3 Operating Precautions

1) The UPS should not be powered up until the entire User's Manual has been reviewed, and understood.
2) The input power source voltage must be within +10% to -15% of the rated input voltage to initially start the UPS. The input frequency must be within the rated input frequency range. Voltages and frequencies outside of the permissible range may cause internal protection devices to activate.
3) Ensure the three-phase input is connected in clockwise rotation (CW). The UPS internal circuitry is designed to disable further operation if the input phasing is installed in counter-clockwise rotation (CCW).
4) The UPS should not be used with a load whose rated input is greater than the rated UPS output.
5) Do not use the UPS to provide power to motors that require high starting current or a long starting time such as vacuum cleaners and machine tools.
6) Do not insert metal objects or combustible materials in the unit's ventilation slots.
7) Do not place, hang, or paste any objects on the top or on the exterior surfaces of the UPS.
8) The capacitors of the UPS maintain a residual charge for a while after turning off the UPS. The required discharge time for each UPS is provided via a cabinet label. Wait for at least the minimum time indicated on the label and ensure that the front panel LED's have gone out before removing the front panel of the UPS after the UPS power has been turned off.
9) Do not attempt to disassemble, modify, or repair the UPS. Call TOSHIBA Service for repair information.
10) Turn the power on only after attaching **ALL** the covers and **DO NOT** remove any covers of the UPS when the power is on.
11) If the UPS should emit smoke or an unusual odor or sound, turn the power off immediately.
12) The heat sink and other components may become extremely hot to the touch. Allow the unit to cool before coming into contact with these items.
13) Warning signs should be placed on or near the load to let people know that the load is being powered by the UPS.
14) Additional warnings and notifications shall be posted at the equipment installation location as deemed required by **Qualified Personnel**.

CAUTION When the UPS is in the Inverter mode, turning the breaker to the OFF position will cause the unit to go into the battery backup mode. The UPS will continue to provide power to the load. The unit must be in Bypass mode and then the breaker turned to the OFF position for the UPS to shut down power to the load.

CAUTION Do not EPO (Emergency Power OFF) the UPS and then reset the breaker until the UPS has been fully discharged. The UPS could be damaged if the unit is not fully powered down before the breaker is reset.

6 UPS Connections

6.1 Power Connections

6.1.1 Power Connections 15/25/30 kVA with Internal Batteries

The following illustrates the wiring connections from the power distribution panel (not part of the UPS) to the terminal block of the 15/25/30 kVA UPS Models. (Maximum wire capacity for TB1 and TB4 is 1 AWG.)

Ensure the three-phase commercial power input is connected for clockwise rotation. The UPS output function is disabled if the input power is not phased for clockwise rotation.

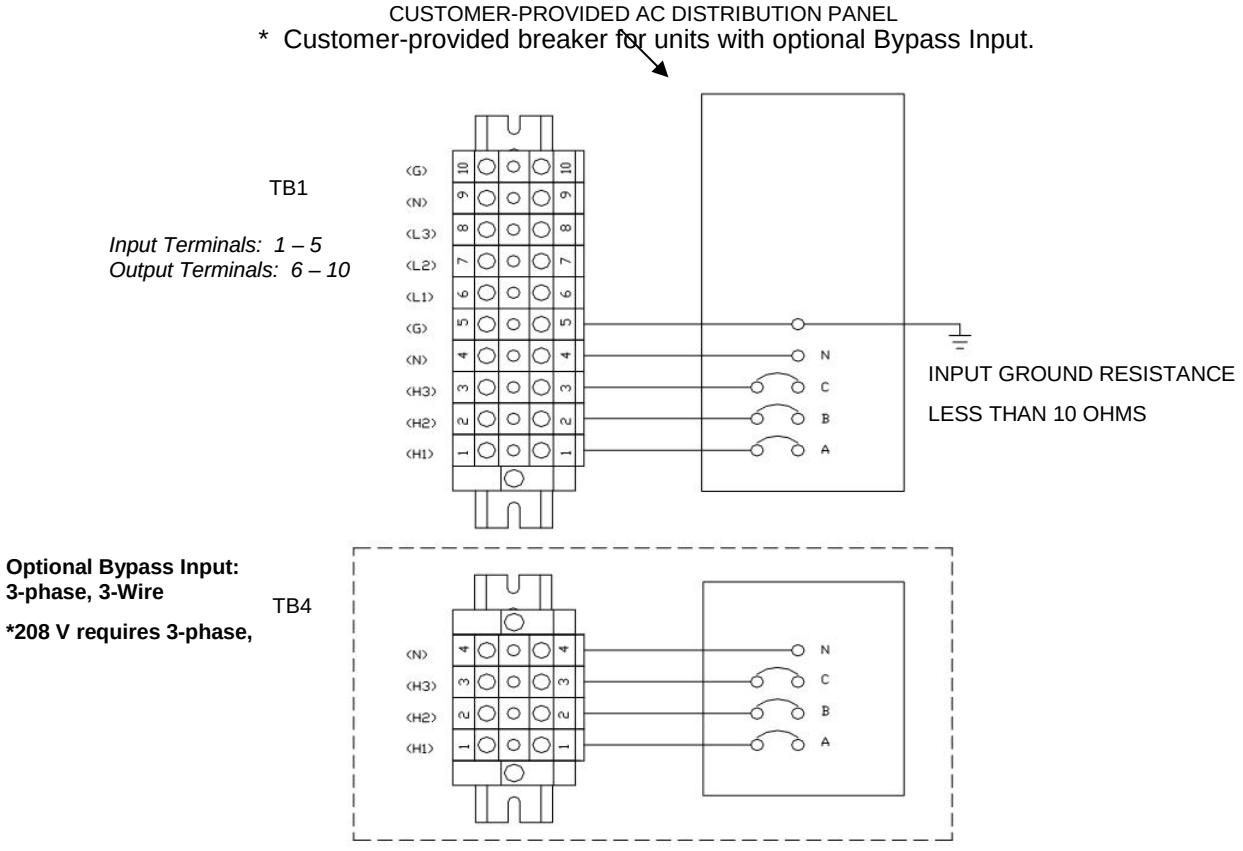
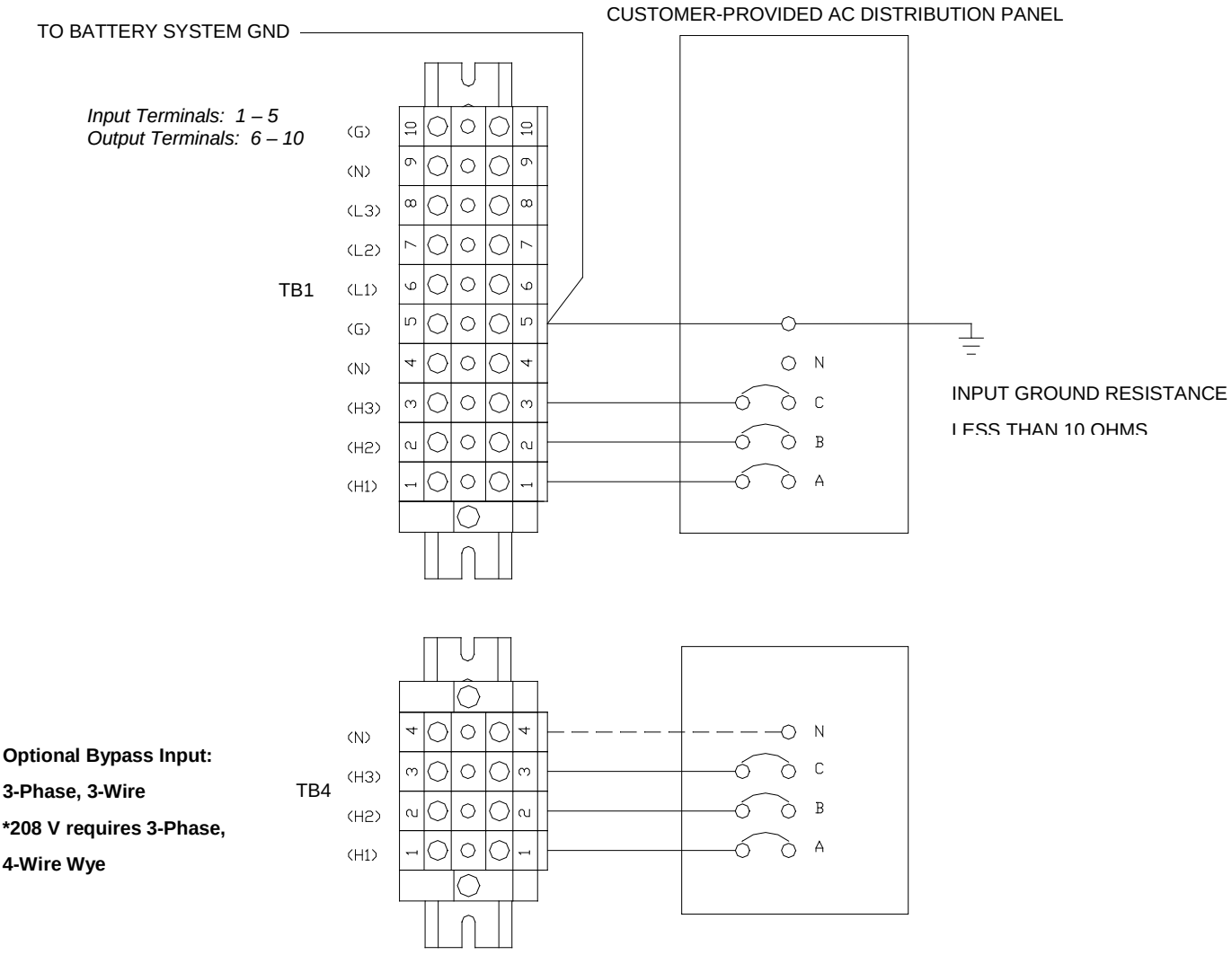


Figure 6-1 Power Cabling for 15-30kVA Units with Internal Batteries

6.1.2 Power Connections 15/25/30 kVA with Internal Transformer

The following illustrates the wiring connections from the power distribution panel (not part f the UPS) to the terminal block of the 15/25/30 kVA UPS Models. (Maximum wire capacity for TB1 and TB4 is 1 AWG.)

Ensure the three-phase commercial power input is connected for clockwise rotation. The UPS



* Customer-provided breaker for units with optional Bypass Input.

Figure 6-2 Power Connections 15/25/30 kVA with Internal Transformer

6.1.3 Recommended Wire Size and Torque Requirements for 15/25/30kVA

Minimum wire sizes are based on NEC Table 310.16. Neutral wire sized per NEC Article 310.15(B), Grounding wires sized per NEC Article 250.122. Maximum wire capacity of the terminal lugs is 1 AWG.

Table 6.1 Cable Size for Different 3P-3W I/O Voltages

Minimum / Maximum Wire Size and Torque requirements UPS Input/Bypass Terminals **TB1** 15-30 kVA **(USE MINIMUM 75 °C INSULATED COPPER WIRING)**												
Input/ Bypass: (L1) (L2) (L3) (N)	**15 kVA**				**25 kVA**				**30 kVA**			
	AWG (L1) – (L3)	**AWG (N)**	**Torque (inch-lbs.) (L1)-(L3)**	**(N)**	**AWG (L1)-(L3)**	**AWG (N)**	**Torque (inch-lbs.) (L1)-(L3)**	**(N)**	**AWG (L1)-(L3)**	**AWG (N)**	**Torque (inch-lbs.) (L1)-(L3)**	**(N)**
120/208 V	6 – 1	4 – 1	51	51	3 – 1	1	51	87	2 – 1	1	87	87
208 V	6 – 1	N/A	51	N/A	3 – 1	N/A	51	N/A	2 – 1	N/A	87	N/A
220 V	6 – 1	N/A	51	N/A	4 – 1	N/A	51	N/A	2 – 1	N/A	87	N/A
240 V	8 – 1	N/A	51	N/A	6 – 1	N/A	51	N/A	2 – 1	N/A	87	N/A
380 V	10 – 1	N/A	35	N/A	6 – 1	N/A	51	N/A	6 – 1	N/A	51	N/A
400 V	10 – 1	N/A	35	N/A	6 – 1	N/A	51	N/A	6 – 1	N/A	51	N/A
415 V	10 – 1	N/A	35	N/A	6 – 1	N/A	51	N/A	6 – 1	N/A	51	N/A
480 V	10 – 1	N/A	35	N/A	8 – 1	N/A	51	N/A	6 – 1	N/A	51	N/A
600 V	10 – 1	N/A	35	N/A	10 – 1	N/A	35	N/A	10 – 1	N/A	35	N/A

Table 6.2 Cable Size for 3P-4W I/O Voltages

Output: (L1) (L2) (L3) (N)	**15 kVA**				**25 kVA**				**30 kVA**			
	AWG (L1) – (L3)	**AWG (N)**	**Torque (inch-lbs.) (L1)-(L3)**	**(N)**	**AWG (L1)-(L3)**	**AWG (N)**	**Torque (inch-lbs.) (L1)-(L3)**	**(N)**	**AWG (L1)-(L3)**	**AWG (N)**	**Torque (inch-lbs.) (L1)-(L3)**	**(N)**
120/208 V	6 – 1	4 – 1	51	51	3 – 1	1	51	87	2 – 1	1	87	87
127/220 V	6 – 1	4 – 1	51	51	3 – 1	1	51	87	2 – 1	1	87	87
240 V	6 – 1	N/A	51	N/A	3 – 1	N/A	51	N/A	2 – 1	N/A	87	N/A
220/380 V	10 – 1	8 – 1	35	51	8 – 1	4 – 1	51	51	6 – 1	2 – 1	51	87
230/400 V	10 – 1	8 – 1	35	51	8 – 1	4 – 1	51	51	6 – 1	2 – 1	51	87
240/415 V	10 – 1	8 – 1	35	51	8 – 1	4 – 1	51	51	6 – 1	2 – 1	51	87
277/480 V	10 – 1	8 – 1	35	51	8 – 1	6 – 1	51	51	6 – 1	2 – 1	51	87
600 V	10 – 1	N/A	35	N/A	10 – 1	N/A	35	N/A	10 – 1	N/A	35	N/A

Table 6.3 Cable Size for Ground

Input/ Bypass/ Output (GND)	**15 kVA**		**25 kVA**		**30 kVA**	
	AWG*	**Torque**	**AWG***	Torque	**AWG***	**Torque**
(G)	10 – 1	35 in-lbs.	8 – 1	51 in-lbs.	6 – 1	51 in-lbs.

*Maximum Wire Size is 1 AWG.

Table 6.4 Bypass Wire Size

Minimum / Maximum Wire Size and Torque Requirements UPS Optional Separate Bypass Input **TB4** 15 / 25kVA **(USE MINIMUM 75 °C INSULATED COPPER WIRING)**						
Phase: (A) (B) (C) Input: (H1) (H2) (H3)	**15 kVA**		**25 kVA**		**30 kVA**	
	AWG*	**Torque**	**AWG***	**Torque**	**AWG***	**Torque**
208 V	8 – 1	51 in-lbs.	4 – 1	51 in-lbs.	2 – 1	87 in-lbs.
220 V	8 – 1	51 in-lbs.	4 – 1	51 in-lbs.	2 – 1	87 in-lbs.
240 V	8 – 1	51 in-lbs.	4 – 1	51 in-lbs.	2 – 1	87 in-lbs.
380 V	10 – 1	35 in-lbs.	8 – 1	51 in-lbs.	6 – 1	51 in-lbs.
400 V	10 – 1	35 in-lbs.	8 – 1	51 in-lbs.	6 – 1	51 in-lbs.
415 V	10 – 1	35 in-lbs.	8 – 1	51 in-lbs.	6 – 1	51 in-lbs.
480 V	10 – 1	35 in-lbs.	8 – 1	51 in-lbs.	6 – 1	51 in-lbs.
600 V	10 – 1	35 in-lbs.	10 – 1	35 in-lbs.	10 – 1	35 in-lbs.

*Maximum Wire Size is 1 AWG.

6.1.4 Power Connection Cable Routing and Conduit Placement 15/25/30 kVA

The following illustrates the proper cable routing that should be followed during the power connection process of the 15/25/30 kVA.

Note:

1) Input and Output conductors shall be installed in separate conduits, and installed in accordance with the latest edition of NEC and the Local Authority having jurisdiction.
2) Battery conductors shall be installed in a separate conduit and be of low resistance type.

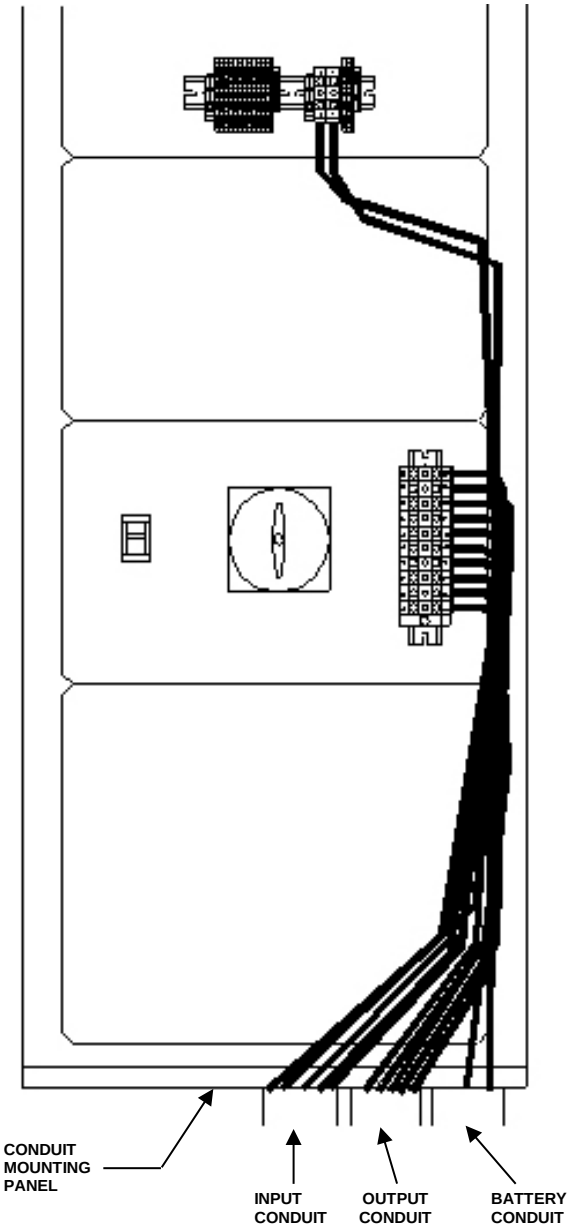
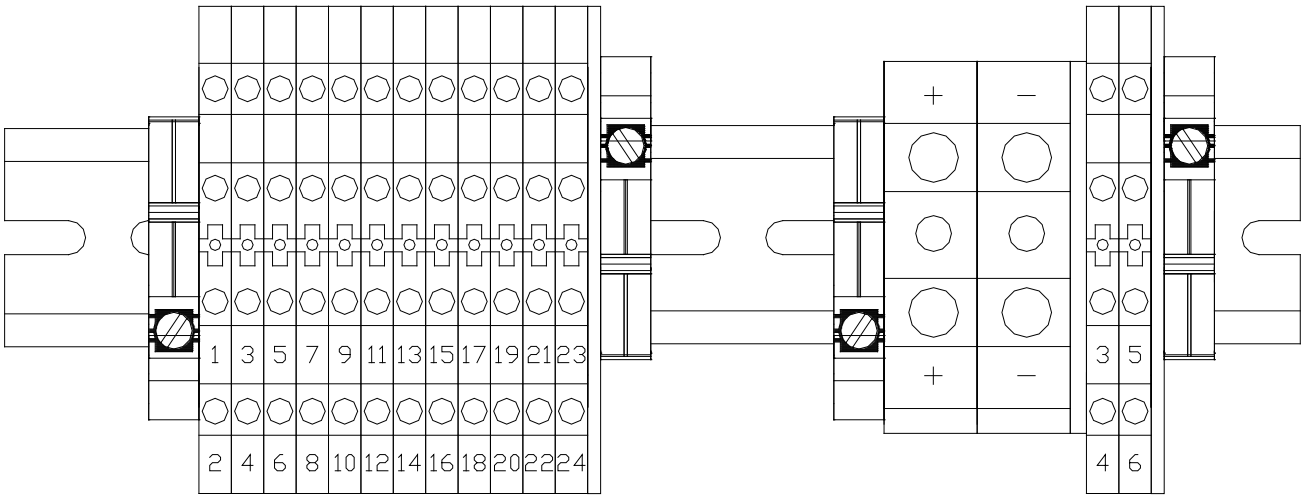


Figure 6-3 15030kVA Cable Routing

6.2 Control Circuit and External Battery Interface Connections 15/25/30 kVA

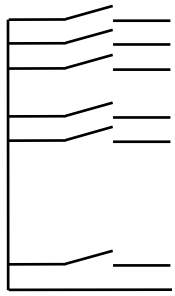
The following illustrates the wiring connections of the Control Circuits, and Battery Interface Circuits.

NOTE: Control circuit wiring should be routed in its own conduit. Do not route control circuit wiring through conduit containing UPS power cables.



(These terminals not available on Base units)

(These terminals on ALL units)



(1) Low Battery
(2) Battery Discharge
(3) Fault
(4) Not Used
(5) Inverter Supply
(6) Inverter Supply
(7) 24Vdc – 1A max. (P24A3)
(8) Remote Run (Switch UPS to Inverter Mode)*
(9) 24Vdc – 1 A max. (P24A3)
(10) Remote Stop (Switch UPS to Static Bypass)*
(11) Bypass
(12) COMMON
(13) EPO (24Vdc – 1A max.)
(14) EPO (24Vdc – 1A max.)
(15) – (24) Not Used

*Must be programmed in via the front panel

Battery Connection
(+) Positive
(-) Negative

(3) Battery Shunt Trip
(4) Battery Shunt Trip
(5) Battery Aux

Figure 6-4 15-30kVA Control and Battery Terminals –TB-3

Table 6.5 Remote Contacts Assignment

No.	TERMINAL	FUNCTION
1	Low Batt	*(Dry Contact)* **Closed** when battery voltage drops below minimum.
2	Batt Discharge	*(Dry Contact)* **Closed** when the Internal/external batteries are discharging into the DC Bus.
3	Fault	*(Dry Contact)* **Closed** when fault occurs. Generic fault warning, could mean any of several things; DCOC (DC Over Current), DCUB (DC Unbalanced) etc.
4	N/C	**(Not Connected)**
5	Inverter Supply	*(Dry Contact)* **Closed** when inverter is operating normally.
6	Inverter Supply	*(Dry Contact)* **Closed** when inverter is operating normally. (Duplicate terminals)
7	P24A3	24 Vdc 1 A max. source for Remote Run.
8	Remote Run*	Apply 24V to switch UPS to Inverter Mode *NOTE: The connection to the remote run inputs on terminals 7 and 8 must be a discrete dry contact and must not be connected to other powered circuits. Connection to other powered circuits may result in unpredictable circuit operation or failure.*
9	P24A3	24 Vdc (P24A3)
10	Remote Stop*	Apply 24Vdc to switch UPS to Static Bypass. The UPS will transfer to bypass as soon as the input and bypass power are in sync. *NOTE: The connection to the remote stop inputs on terminals 9 and 10 must be a discrete dry contact and must not be connected to other powered circuits. Connection to other powered circuits may result in unpredictable circuit operation or failure.*
11	Bypass	*(Dry Contact)* **Closed** when UPS is in Bypass. *NOTE: Even though Remote Stop may be triggered, the UPS is not in Bypass until Terminal 11 closes.*
12	Common	
13	EPO	*(Dry Contact)* **Short** across 13 and 14 will shut down all power in the UPS including bypass and battery backup, and will cause the Battery Shunt Trip to open the external battery breaker.
14	EPO	*(Dry Contact)* **Short** across 13 and 14 will shut down all power in the UPS including bypass and battery backup, and will cause the Battery Shunt Trip to open the external battery breaker.
15 – 24	N/C	**(Not Connected)**

***Remote Run** and **Remote Stop** must be enabled via the front panel. Once remote mode is enabled, the key switch on the front panel is rendered inoperable until remote mode is disabled via the front panel.

6.2.1 Recommended Wire Size and Torque Requirements

Table 6.6 UPS Control and Battery Wiring

Minimum Wire Size and Torque Requirements UPS Control and Battery Interface Circuits **USE MINIMUM 75 °C COPPER WIRING**				
TERMINAL (TERMINAL #)	**Wire Size AWG***			**TIGHTENING TORQUE**
	15 kVA	**25 kVA**	**30 kVA**	
UPS CONTROL CIRCUITS (1-24)*	14-16	14-16	14-16	8 in-lbs.
BATTERY CONTROL CIRCUITS (3-6)*	14-16	14-16	14-16	8 in-lbs.
BATTERY (+/-)	6 – 1	2 – 1	1	45 in-lbs.

***Indicates Class 1 wiring methods are to be used. Maximum Wire Size for Control Circuits is 12 AWG. Maximum for Battery is 1 AWG.**

6.3 Power Connections – 50 kVA

The following illustrates the wiring connections from the power distribution panel (not part of the UPS) to the terminal block of the 50 kVA UPS Model

The Ground lugs are located to the left of TB4. See illustration, below.

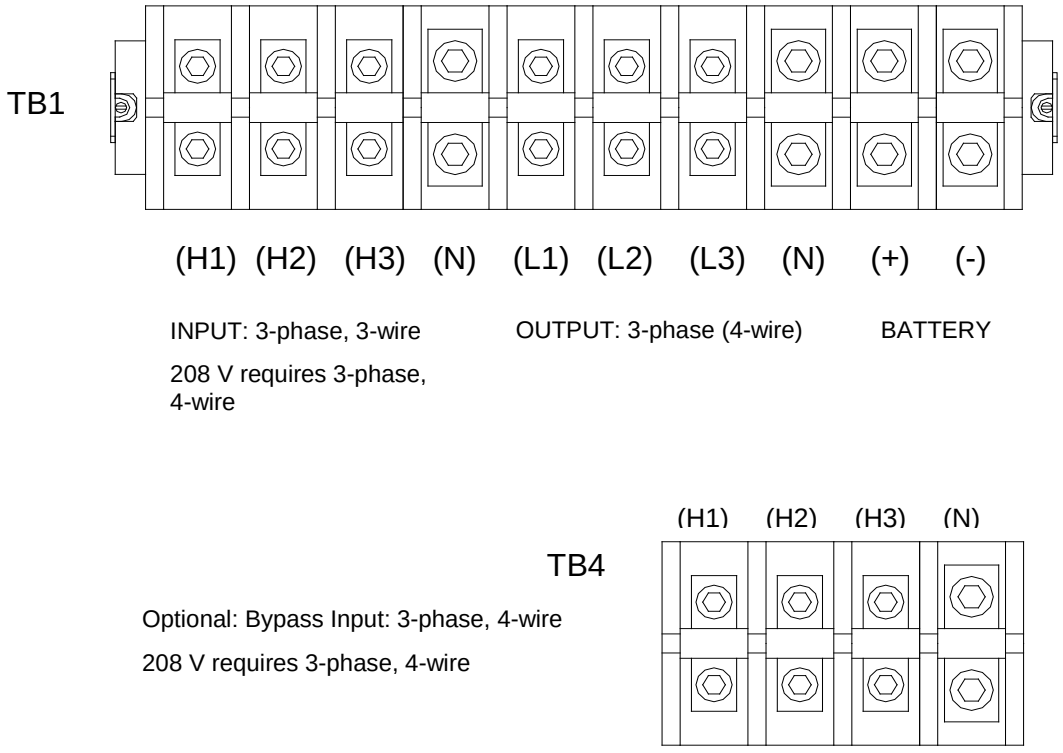


Figure 6-5 Power Terminals - 50kVA

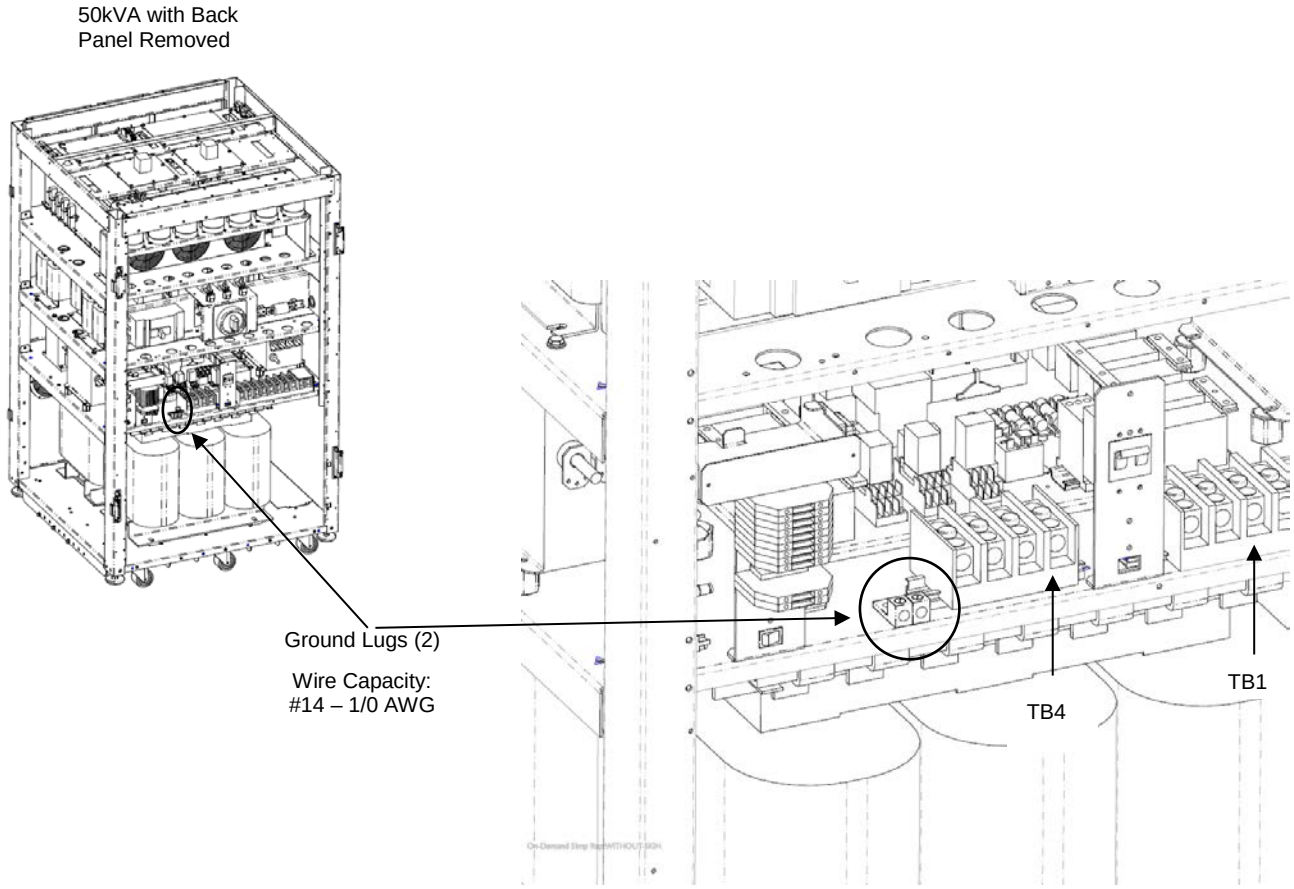


Figure 6-6 Terminal Board Locations - 50lVA

6.3.1 Recommended Wire Size and Torque Requirements for 50kVA

Minimum wire sizes are based on NEC Table 310.16. Neutral wire is sized per NEC Article 310.15(B), Grounding wires sized per NEC Article 250.122. Maximum wire capacity of the power terminal lugs is 250kcmil.

Table 6.7 50kVA Cabling Sizes

Minimum / Maximum Wire Size and Torque Requirements UPS Input and Output Terminals **TB1** 50 kVA* **(USE MINIMUM 75 °C INSULATED COPPER WIRING)**						
INPUT:			**OUTPUT:**			
(H1) (H2) (H3)	**AWG**	**NEUTRAL AWG**	**(L1)(L2) (L3)**	**AWG**	**NEUTRAL AWG ****	**Tightening Torque**
208 V	2/0 – 250 kcmil	250 kcmil	208/120 V	2/0 – 250 kcmil	250 kcmil	200 in-lbs.
220 V	2/0 – 250 kcmil	4/0 – 250 kcmil	220/127 V	2/0 – 250 kcmil	4/0 – 250 kcmil	200 in-lbs.
240 V	2/0 – 250 kcmil	N/A	240 V	1/0 – 250 kcmil	N/A	200 in-lbs.
380 V	2 – 250 kcmil	1/0 – 250 kcmil	380/220 V	4 – 250 kcmil	1/0 – 250 kcmil	200 in-lbs.
400 V	3 – 250 kcmil	1/0 – 250 kcmil	400/230 V	4 – 250 kcmil	1/0 – 250 kcmil	200 in-lbs.
415 V	3 – 250 kcmil	1 – 250 kcmil	415/240 V	4 – 250 kcmil	1 – 250 kcmil	200 in-lbs.
480 V	4 – 250 kcmil	2 – 250 kcmil	480/277 V	6 – 250 kcmil	1 – 250 kcmil	200 in-lbs.
600 V	6 – 250 kcmil	N/A	600 V	6 – 250 kcmil	N/A	200 in-lbs.

Table 6.8 Bypass Cabling Sizes

Minimum / Maximum Wire Size and Torque requirements UPS Optional Bypass Input Terminals **TB4** 50 kVA **(USE MINIMUM 75 °C INSULATED COPPER WIRING)**			
Phase: (A) (B) (C) (N) Input: (H1) (H2) (H3)	**50 kVA**		
	AWG*	**NEUTRAL AWG***	**Tightening Torque**
208/120 V	1/0 – 250 kcmil	250 kcmil	200 in-lbs.
220 V	1/0 – 250 kcmil	250 kcmil	200 in-lbs.
240 V	1/0 – 250 kcmil	N/A	200 in-lbs.
380 V	2 – 250 kcmil	2/0 – 250 kcmil	200 in-lbs.
400 V	3 – 250 kcmil	2/0 – 250 kcmil	200 in-lbs.
415 V	3 – 250 kcmil	1 – 250 kcmil	200 in-lbs.
480 V	4 – 250 kcmil	2 – 250 kcmil	200 in-lbs.
600 V	6 – 250 kcmil	N/A	200 in-lbs.

Table 6.9 Battery Cabling - 50kVA

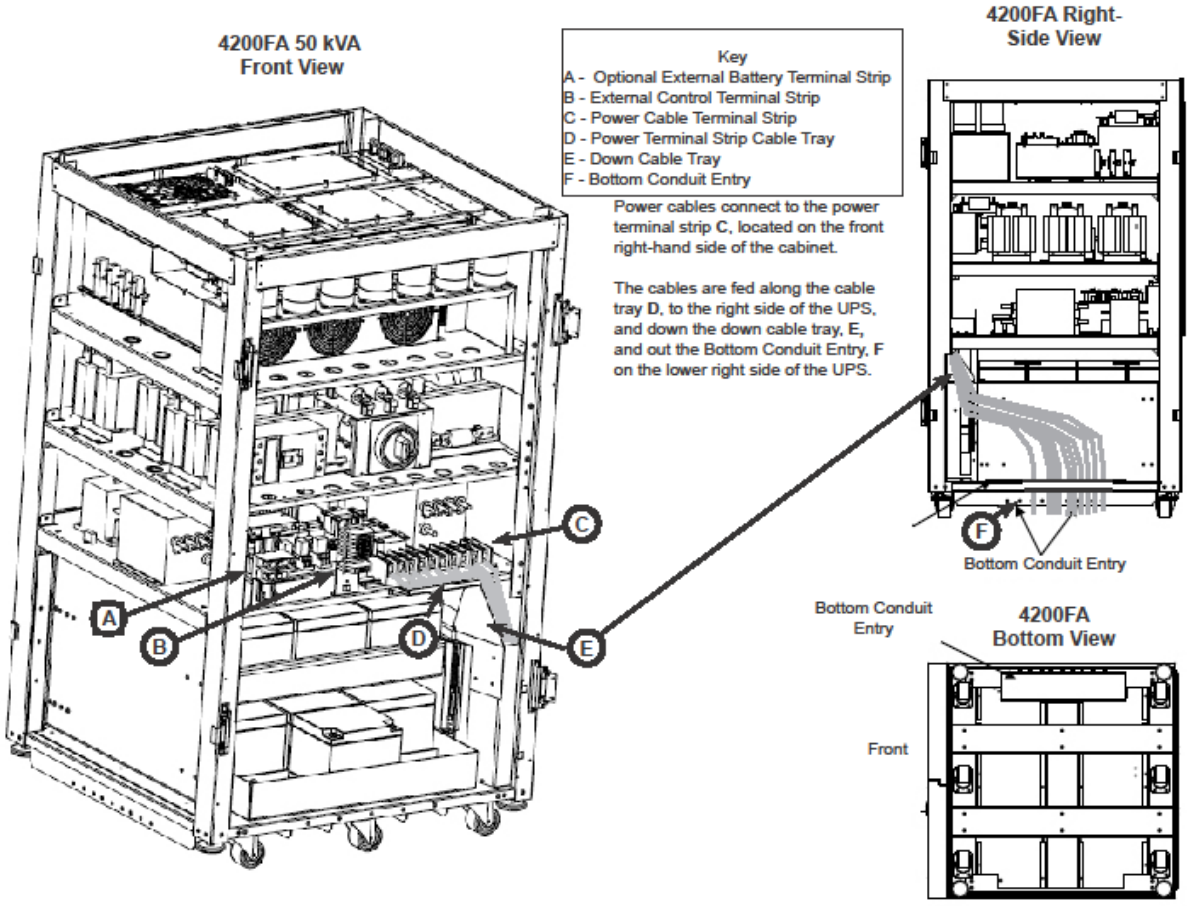
Minimum / Maximum Wire Size and Torque requirements UPS Battery Input Terminals **TB1** 50 kVA **(USE MINIMUM 75 °C INSULATED COPPER WIRING)**		
Battery (+) / (-)	**50 kVA**	
	AWG*	**Tightening Torque**
(+) (-)	4/0 – 250 kcmil	200 in-lbs.

Table 6.10 Grounding Cabling - 50kVA

Minimum / Maximum Wire Size and Torque requirements UPS Ground Lugs 50 kVA **(USE MINIMUM 75 °C INSULATED COPPER WIRING)**		
Input/ Output (GND)	**50 kVA**	
	AWG	**Tightening Torque**
208-240 VAC	6 – 250 kcmil	200 in-lbs.
380-480 VAC	6 – 250 kcmil	200 in-lbs.
600 VAC	8 – 250 kcmil	200 in-lbs.

6.3.2 Power Cable Routing and Conduit Placement 50 kVA

The following illustrates the proper cable routing that should be followed during the power connection process for the 50kVA.


4200FA 50 kVA
Front View
Key
A - Optional External Battery Terminal Strip
B - External Control Terminal Strip
C - Power Cable Terminal Strip
D - Power Terminal Strip Cable Tray
E - Down Cable Tray
F - Bottom Conduit Entry
Power cables connect to the power terminal strip C, located on the front right-hand side of the cabinet.
The cables are fed along the cable tray D, to the right side of the UPS, and down the down cable tray, E, and out the Bottom Conduit Entry, F on the lower right side of the UPS.
4200FA Right-Side View
Bottom Conduit Entry
Bottom Conduit Entry
4200FA Bottom View
Front
A
B
C
D
E
F

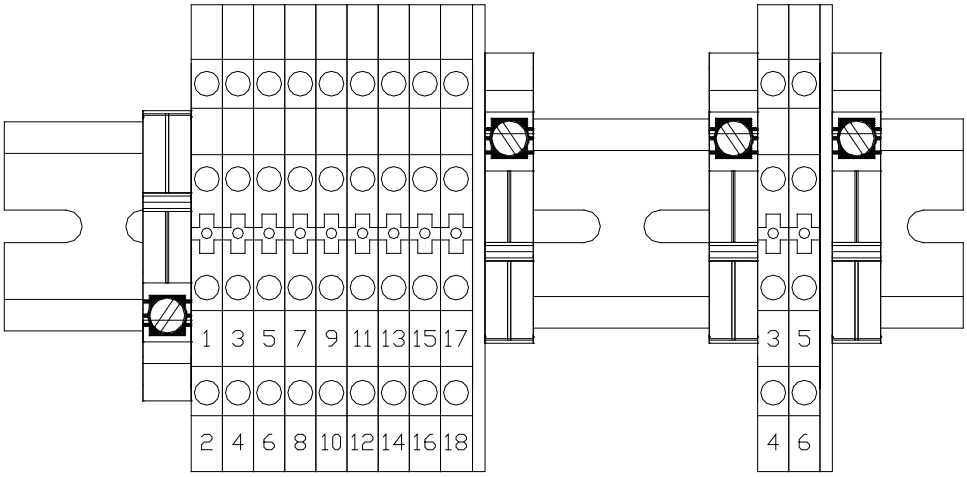
Note: Cabinet show with batteries, cabling is the same for units with internal batteries, internal transformers, and neither internal batteries nor transformers.

Figure 6-7 50kVA Cable Routing and Terminal Location

6.4 Control Circuit and External Interface Connections 50 kVA

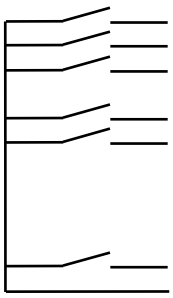
The following illustrates the wiring connections of the Control Circuits, and Battery Interface Circuits for the 50kVA.

NOTE: Control circuit wiring should be routed in it's own conduit. Do not route control circuit wiring through conduit containing UPS power cables.



(These terminals not available on Base units)

(These terminals on ALL units)



(1) Low Battery
(2) Battery Discharge
(3) Fault
(4) Not Used
(5) Inverter Supply
(6) Inverter Supply
(7) 24Vdc – 1A max. (P24A3)
(8) Remote Run (Switch UPS to Inverter Mode)*
(9) 24Vdc – 1 A max. (P24A3)
(10) Remote Stop (Switch UPS to Static Bypass)*

(3) Battery Shunt Trip
(4) Battery Shunt Trip
(5) Battery Aux

Figure 6-8 50kVA External Interface Assignments

Table 6.11 TB-3 Lug Assignment

No.	TERMINAL	FUNCTION
1	Low Batt	*(Dry Contact)* **Closed** when battery voltage drops below minimum.
2	Batt Discharge	*(Dry Contact)* **Closed** when the Internal/external batteries are discharging into the DC Bus.
3	Fault	*(Dry Contact)* **Closed** when fault occurs. Generic fault warning, could mean any of several things, DCOC (DC Over Current), DCUB (DC Unbalanced) etc.
4	N/C	**(Not Connected)**
5	Inverter Supply	*(Dry Contact)* **Closed** when inverter is operating normally.
6	Inverter Supply	*(Dry Contact)* **Closed** when inverter is operating normally. (Duplicate terminals)
7	P24A3	24 Vdc 1 A max. source for Remote Run.
8	Remote Run*	Apply 24V to switch UPS to Inverter Mode *NOTE: The connection to the remote run inputs on terminals 7 and 8 must be a discrete dry contact and must not be connected to other powered circuits. Connection to other powered circuits may result in unpredictable circuit operation or failure.*
9	P24A3	24 Vdc (P24A3)
10	Remote Stop*	Apply 24Vdc to switch UPS to Static Bypass. The UPS will transfer to bypass as soon as the input and bypass power are in sync. *NOTE: The connection to the remote stop inputs on terminals 9 and 10 must be a discrete dry contact and must not be connected to other powered circuits. Connection to other powered circuits may result in unpredictable circuit operation or failure.*
11	Bypass	*(Dry Contact)* **Closed** when UPS is in Bypass. *NOTE: Even though Remote Stop may be triggered, the UPS is not in Bypass until Terminal 11 closes.*
12	Common	
13	EPO	*(Dry Contact)* **Short** across 13 and 14 will start the shut down all power in the UPS including bypass and battery backup, and will cause the Battery Shunt Trip to open the external battery breaker.
14	EPO	*(Dry Contact)* **Short** across 13 and 14 will shut down all power in the UPS including bypass and battery backup, and will cause the Battery Shunt Trip to open the external battery breaker.
15 – 18	N/C	**(Not Connected)**

***Remote Run** and **Remote Stop** must be enabled via the front panel. Once remote mode is enabled, the key switch on the front panel is rendered inoperable until remote mode is disabled via the front panel.

6.4.1 Recommended Wire Size and Torque Requirements

UPS Control and Battery Interface 50 kVA wire and torque requirements.

Table 6.12 TB-3 Tightening Torque

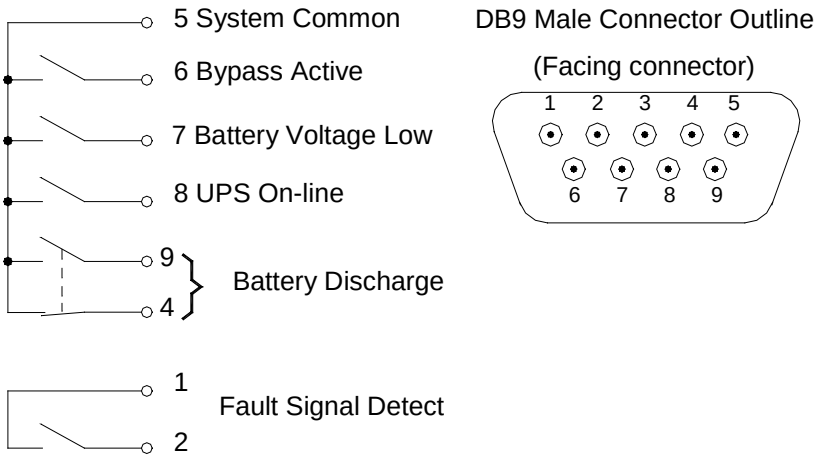
Minimum Wire Size and Torque Requirements UPS Control and Battery Interface Circuits **USE MINIMUM 75 °C COPPER WIRING**		
TERMINAL (TERMINAL #)	**50 kVA**	
	AWG*	**TIGHTENING TORQUE**
UPS CONTROL CIRCUITS (1-24)*	14-16	8 in-lbs.
BATTERY CONTROL CIRCUITS (3-6)*	14-16	8 in-lbs.

***Indicates Class 1 wiring methods are to be used. Maximum Wire Size is 12 AWG.**

6.5 Remote Contact

A remote contact interface is a standard feature on the Premium and Seismic units, and is available as dry switch contacts through a DB9 male connector located on the front of the UPS.

Figure 6-9 shows the contact state and pin assignment for each signal and the associated DB9 connector pin out.



WARNING 50kVA LT units: Only Authorized Personnel may access the remote contact DB-9.

Figure 6-9 DB-9 Pin Assignments

Notes:

1) Pin "switches" are shown in their ***inactive states*****. Example*****:*** (if battery voltage is low, pin 7 will be connected to System Common).
2) Contacts are rated at 30 VDC, 0.1 amps; 125 VAC, 3 amps.
3) Pin number "3" is not used.

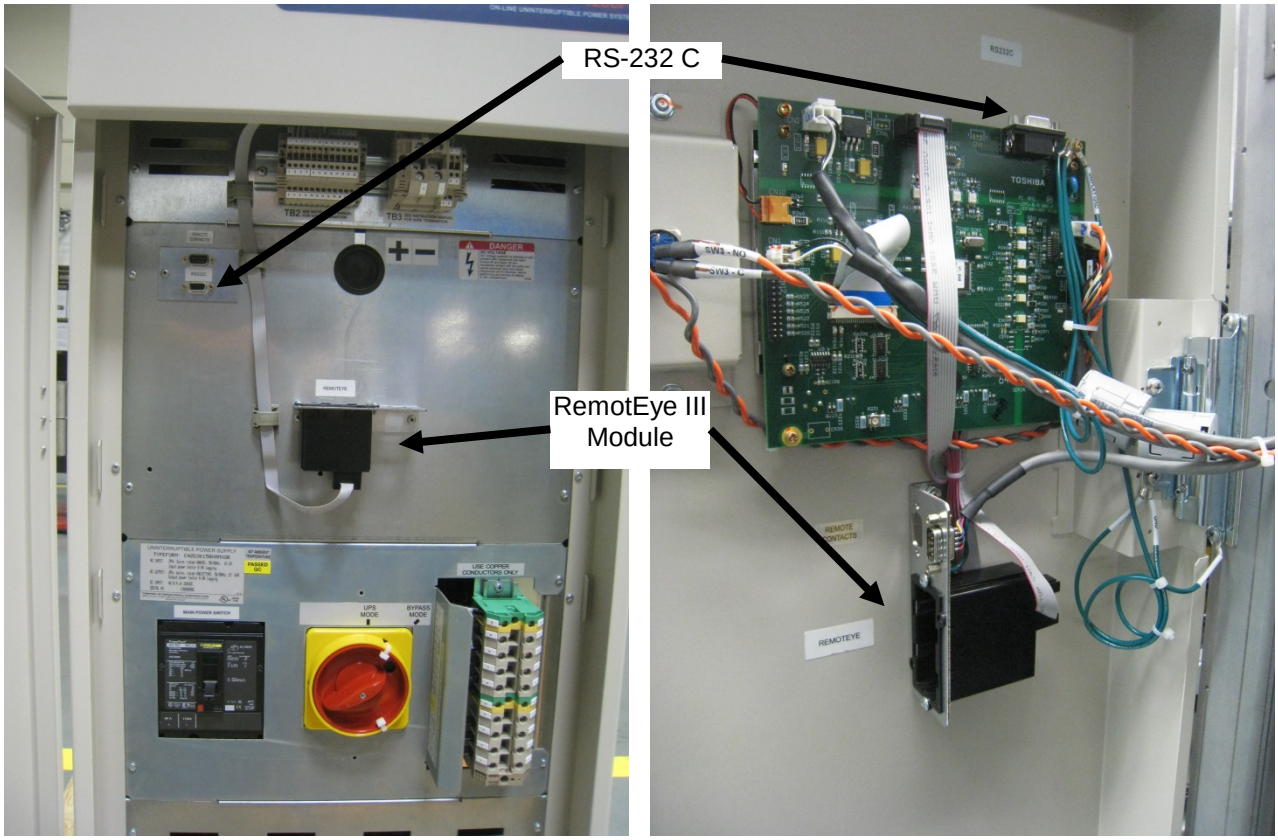
6.6 RemotEye III

RemotEye III provides

The optional RemotEye III interface card provides network access for monitoring and control of the UPS via several internet protocols, including

The RemotEye III interface card is inserted into the RemotEye mounting box as shown in Figure 6-10.

See the RemotEye III



15-30 kVA 50kVA

Figure 6-10 RemotEye III and RS-232 Mounting Locations

6.7 RS-232C

The RS-232C serial communication interface is available through a DB9 female connector located on the inside of the UPS. See Figure 6-10.

This interface allows control of the UPS from a computer network running TOSHIBA RemotEyeIII™ software. The computer and the UPS are connected through a serial RS-232C communication port. The available data from the UPS, via the RS-232C communication link, is shown below:

Table 6.13 RemotEye III Monitored Parameters

Monitored Data	Parameters
Operating Conditions	Input Voltage Output Voltage Input Frequency Output Frequency Battery Voltage Output Current
UPS Operating Status (Described as “yes or “no”)	Utility Power OK Low Battery Voltage Detected UPS in BYPASS Mode UPS in NORMAL Mode Input and Output Frequency Synchronized UPS FAULT Occurred
Fault Details (Described as “occurred” or “not occurred”)	DC Bus Over-Current DC Bus Over-Voltage DC Bus Under-Voltage Input Over-Current Overheat Overload Being Timed Overload (allowable time exceeded) Output Over-Voltage (during Normal Mode) Output Under-Voltage (during Normal Mode)

The DB9 connector pin assignment and female connector outline are shown in Figure 6-11.

Pin	I/O	Symbol	Description
1	This pin is not used		
2	Input	RXD	Receive Data
3	Output	TXD	Transmit Data
4	Output	DTR	Data Terminal Ready
5	-	SG	Signal Ground
6	Input	DSR	Data Set Ready
7	Output	RTS	Request To Send
8	Input	CTS	Clear To Send
9	This pin is not used		

DB9 Female connector outline
(facing connector)

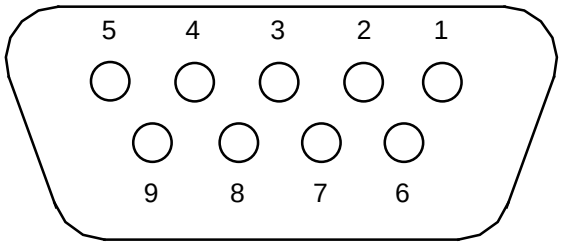


Figure 6-11 RS-232C Pin Assignments

6.7.1 UPS Shutdown (via RS-232C)

When the UPS is operating from its internal batteries, a 'shutdown' order can be sent to the UPS instructing it to turn OFF after a user-specified amount of time.

This function can allows the user to stop discharging the UPS batteries after an orderly system shutdown has been completed.

The UPS can be programmed to turn OFF up to 8 minutes after the 'shutdown' command is given. This command can be cancelled before the specified time has elapsed by following the directions listed on the RS-232C screen.

7 Specifications

7.1 4200*FA* 15 / 25 kVA @ 208 VAC Input/ 208 VAC Output - No Internal Batteries or Transformer

	Model Number	C42F3F150XAXXN C42F3F150XAMXN, -S C42F3F150FAMXN, -S	C42F3F250XAXXN C42F3F250XAMXN, -S C42F3F250FAMXN, -S
	Rated Output Capacity	**15 kVA**	**25 kVA**
	External Dimensions W x D x H (cm)	w/ casters: 20.0" x 36.3" x 59.7"(50.8 cm x 92.2 cm x 151.6 cm) w/o casters: 20.0" x 36.3" x 60.0"(50.8 cm x 92.2 cm x 152.4 cm)	
Input	Rated Voltage	208 VAC	
	Voltage Variation [4,5]	+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]	
	Rated Frequency	50 / 60 Hz	
	Input Cables required	3 phase ; 4 Wire + GND	
	Dual Input Option Cables required	3 phase ; 4 Wire + GND	
	Power Factor [1]	Greater than 0.98 when in inverter mode [1]	
	Required Input kVA	15 kVA	24 kVA
	Walk-in Function	From 20% to 100% over 5 seconds	
	Inrush Current	Less than 8 times the rated current under synchronous operation	
	Current Limit	115% maximum	
	Harmonic Currents [1]	Less than 8.5% [1]	Less than 5.5% [1]
Battery	DC Nominal (Voltage Range)	288 VDC (216 to 332 VDC)	
	Float Charge (Regulation)	324.0 VDC (± 2%)	
	Ripple Voltage	0.5 V R.M.S.	
	Rated Back-up Time [3]	Refer to Battery System Manual	
	Rated Charge Current	10.0 Amps	
Output	Rated Voltage	208 / 120 VAC	
	Rated Current	42.0 Amps	69.5 Amps
	Rated Power Factor	0.8 lagging	
	Output Cables Required	3 phase ; 4 Wire + GND	
	Voltage Regulation (phase-phase)	± 2% (0 – 100% balanced load); ± 3% (0 – 100% unbalanced load)	
	Voltage Adjustment Range	± 5V Manually from the key pad	
	Phase Displacement	± 2° (0 – 100% balanced load); ± 4° (unbalanced load)	
	Rated Frequency	50 / 60 Hz	
	Frequency Regulation	± 0.1% in free running mode	
	Frequency Synchronous	± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician	
	Frequency Slew Rate	1 Hz/s to 3Hz/s (in 0.5 Hz steps)	
	Voltage Transients (Recovery time: 50 ms)	± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer from bypass to inverter)	
	Inverter Overload Capacity	125% for 90 sec; 150% for 30 sec	
	Bypass Overload Capacity	1000% for 10 ms; 125% for 10 min.	
	Crest Factor	2.5 – 3.0 within the kW range	
	Neutral Line Conductor	1.73 times line rating	

	Harmonic Voltage Distortion	1.5% max (linear load)	
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter	
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 86%	AC/DC/AC – See Table 5.10, DC/AC: 87%
	Heat Loss to be removed	See Table 5.10	See Table 5.10
	Audible Noise	60dB (A) at 1 meter from the front of the unit	
	Operating Temperature	32 –104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)	
	Operating Humidity	30 – 90% RH (non condensing)	
	Altitude [3]	Less than 2000 meters [3]	

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 °F (32 °C).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 °F (35 °C).

7.2 4200*FA* 15 / 25 kVA @ 208 VAC Input/ 208 VAC Output w/Internal Batteries

	Model Number	C42F3F150XAXBN C42F3F150XAMBN C42F3F150FAMBN	C42F3F250XAXBN C42F3F250XAMBN C42F3F250FAMBN
	Rated Output Capacity	**15 kVA**	**25 kVA**
	External Dimensions W x D x H (cm)	w/ casters: 20.0" x 36.3" x 59.7"(50.8 cm x 92.2 cm x 151.6 cm) w/o casters: 20.0" x 36.3" x 60.0"(50.8 cm x 92.2 cm x 152.4 cm)	
Input	Rated Voltage	208 VAC	
	Voltage Variation [4,5]	+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]	
	Rated Frequency	50 / 60 Hz	
	Input Cables required	3 phase ; 4 Wire + GND	
	Dual Input Option Cables required	3 phase ; 4 Wire + GND	
	Power Factor [1]	Greater than 0.98 when in inverter mode [1]	
	Required Input kVA	15 kVA	24 kVA
	Walk-in Function	From 20% to 100% over 5 seconds	
	Inrush Current	Less than 8 times the rated current under synchronous operation	
	Current Limit	115% maximum	
	Harmonic Currents [1]	Less than 8.5% [1]	Less than 5.5% [1]
Battery	DC Nominal (Voltage Range)	288 VDC (216 to 332 VDC)	
	Float Charge (Regulation)	324.0 VDC (± 2%)	
	Ripple Voltage	0.5 V R.M.S.	
	Rated Back-up Time [3]	9 min at full load	4 min at full load
	Rated Charge Current	4.0 Amps	
Output	Rated Voltage	208 / 120 VAC	
	Rated Current	42.0 Amps	69.5 Amps
	Rated Power Factor	0.8 lagging	
	Output Cables Required	3 phase ; 4 Wire + GND	
	Voltage Regulation (phase-phase)	± 2% (0 – 100% balanced load); ± 3% (0 – 100% unbalanced load)	
	Voltage Adjustment Range	± 5V Manually from the key pad	
	Phase Displacement	± 2° (0 – 100% balanced load); ± 4° (unbalanced load)	
	Rated Frequency	50 / 60 Hz	
	Frequency Regulation	± 0.1% in free running mode	
	Frequency Synchronous	± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician	
	Frequency Slew Rate	1 Hz/s to 3Hz/s (in 0.5 Hz steps)	
	Voltage Transients (Recovery time: 50 ms)	± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer from bypass to inverter)	
	Inverter Overload Capacity	125% for 90 sec; 150% for 30 sec	
	Bypass Overload Capacity	1000% for 10 ms; 125% for 10 min.	
	Crest Factor	2.5 – 3.0 within the kW range	
	Neutral Line Conductor	1.73 times line rating	
	Harmonic Voltage Distortion	1.5% max (linear load)	
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter	

Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 86%	AC/DC/AC – See Table 5.10, DC/AC: 87%
	Heat Loss to be removed	See Table 5.10	See Table 5.10
	Audible Noise	60dB (A) at 1 meter from the front of the unit	
	Operating Temperature	32 –104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)	
	Operating Humidity	30 – 90% RH (non condensing)	
	Altitude [3]	Less than 2000 meters [3]	

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 ºF (32 ºC).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 ºF (35 ºC).

7.3 4200*FA* 15/25 kVA w/Internal Transformer

	Model Number		**C42#3*150#AMXN, -S**	**C42#3*250#AMXN, -S**
		Input	**# =(B: 208; H: 220; C: 240; N: 380–415 Δ-wye; P: 380–415 wye; D: 480; M: 600) VAC**	
		Output	***=(F: 208; H: 220 wye; J: 240; P: 380–415 wye; K: 480 wye: M:600) VAC**	
	Rated Output Capacity		**15 kVA**	**25 kVA**
	External Dimensions W x D x H (cm)		w/ casters: 20.0" x 36.3" x 59.7"(50.8 cm x 92.2 cm x 151.6 cm) w/o casters: 20.0" x 36.3" x 60.0"(50.8 cm x 92.2 cm x 152.4 cm)	
Input	Rated Voltage		208; 220; 240; 380; 400; 415; 480; 600 VAC (Determined by Input Transformer internal to the unit)	
	Voltage Variation [4,5]		+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]	
	Rated Frequency		50/60 Hz	
	Input Cables Required		3 phase ; 3 Wire + GND	
	Dual Input Option Cables required		3 phase ; 4 Wire + GND	
	Power Factor [1]		Greater than 0.98 when in inverter mode [1]	
	Required Input kVA		16 kVA	26 kVA
	Walk-in Function		From 20% to 100% over 5 seconds	
	Inrush Current		Less than 8 times the rated current under synchronous operation	
	Current Limit		115% maximum	
	Harmonic Currents [1]		Less than 8.5% [1]	Less than 5.5% [1]
Battery	DC Nominal (Voltage Range)		288 VDC (216 – 332 VDC)	
	Float Charge (Regulation)		324.0 VDC (± 2%)	
	Ripple Voltage		0.5 V R.M.S.	
	Rated Back-up Time [2]		Refer to Battery System Manual [2]	
	Rated Charge Current		10.0 Amps	
Output	Rated Voltage		(Determined by Output Transformer internal to the unit)	
	Rated Current		VA / Nominal Output Voltage / 1.73	
	Rated Power Factor		0.8 lagging	
	Output Cables Required		3 phase ; 4 Wire + GND	
	Voltage Regulation (phase-phase)		± 5% (0 – 100% balanced load); ± 6% (0 – 100% unbalanced load)	
	Voltage Adjustment Range		± 5V Manually from key pad	
	Phase Displacement		± 2° (0 –100% balanced load); ± 4° (unbalanced load)	
	Rated Frequency		50 / 60 Hz	
	Frequency Regulation		± 0.1% in free running mode	
	Frequency Synchronous		± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician	
	Frequency Slew Rate		1 Hz/s to 3Hz/s (in 0.5 Hz steps)	
	Voltage Transients (Recovery time: 50 ms)		± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer from bypass to inverter)	
	Inverter Overload Capacity		125% for 90 sec; 150% for 30 sec	
	Bypass Overload Capacity		1000% for 10ms; 125% for 10 min.	
	Crest Factor		2.5 – 3.0 within the kW range	
	Neutral Line Conductor		1.73 times line rating	

	Harmonic Voltage Distortion	1.5% max (linear load)	
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter	
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 82%	AC/DC/AC – See Table 5.10, DC/AC: 83%
	Heat loss to be removed	See Table 5.10	See Table 5.10
	Audible Noise	60dB (A) at 1 meter from the front of the unit	
	Operating Temperature	32 – 104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)	
	Operating Humidity	30 – 90% RH (non condensing)	
	Altitude [3]	Less than 2000 meters [3]	

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 °F (32 °C).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 °F (35 °C).

7.4 4200*FA* 30 kVA @ 208 VAC Input/ 208 VAC Output - No Internal Batteries, No Internal Transformer

	Model Number	T42F3F300XAXXN T42F3F300XAMXN, -S T42F3F300FAMXN, -S
	Rated Output Capacity	**30 kVA**
	External Dimensions W x D x H (cm)	w/ casters: 20.0" x 36.3" x 59.7"(50.8 cm x 92.2 cm x 151.6 cm) w/o casters: 20.0" x 36.3" x 60.0"(50.8 cm x 92.2 cm x 152.4 cm)
Input	Rated Voltage	208 VAC
	Voltage Variation [4,5]	+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]
	Rated Frequency	50 / 60 Hz
	Input Cables required	3 phase ; 4 Wire + GND
	Dual Input Option Cables required	3 phase ; 4 Wire + GND
	Power Factor [1]	Greater than 0.98 when in inverter mode [1]
	Required Input kVA	28.0 kVA
	Walk-in Function	From 20% to 100% over 5 seconds
	Inrush Current	Less than 8 times the rated current under synchronous operation
	Current Limit	115% maximum
	Harmonic Currents [1]	Less than 3% THD [1]
Battery	DC Nominal (Voltage Range)	288 VDC (216 to 332 VDC)
	Float Charge (Regulation)	324.0 VDC (± 2%)
	Ripple Voltage	0.5 V R.M.S.
	Rated Back-up Time [2]	Refer to Battery System Manual
	Rated Charge Current	10.0 Amps
Output	Rated Voltage	208 / 120 VAC
	Rated Current	83.4 Amps
	Rated Power Factor	0.8 lagging
	Output Cables Required	3 phase ; 4 Wire + GND
	Voltage Regulation (phase-phase)	± 2% (0 – 100% balanced load); ± 3% (0 – 100% unbalanced load)
	Voltage Adjustment Range	± 5V Manually from the key pad
	Phase Displacement	± 2° (0 – 100% balanced load); ± 4° (unbalanced load)
	Rated Frequency	50 / 60 Hz
	Frequency Regulation	± 0.1% in free running mode
	Frequency Synchronous	± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician
	Frequency Slew Rate	1 Hz/s to 3Hz/s (in 0.5 Hz steps)
	Voltage Transients (Recovery time: 50 ms)	± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer of bypass to inverter)
	Inverter Overload Capacity	125% for 90 sec; 150% for 30 sec
	Bypass Overload Capacity	1000% for 10 ms; 125% for 10 min.
	Crest Factor	2.5 – 3.0 within the kW range

	Neutral Line Conductor	1.73 times line rating
	Harmonic Voltage Distortion	1.5% max (linear load)
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 89%
	Heat loss to be removed	See Table 5.10
	Audible Noise	60dB (A) at 1 meter from the front of the unit
	Operating Temperature	32 – 104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)
	Operating Humidity	30 – 90% RH (non condensing)
	Altitude [3]	Less than 6600 ft (2000 m) [3]

1 **–** Specified at rated conditions under balanced linear loads.

2 **–** Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 **–** At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 °F (32 °C).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 °F (35 °C).

7.5 4200*FA* 30 kVA @ 208 VAC Input/ 208 VAC Output w/Internal Batteries

	Model Number	T42F3F300XAXBN T42F3F300XAMBN T42F3F300FAMBN
	Rated Output Capacity	**30 kVA**
	External Dimensions W x D x H (cm)	w/ casters: 20.0" x 36.3" x 59.7"(50.8 cm x 92.2 cm x 151.6 cm) w/o casters: 20.0" x 36.3" x 60.0"(50.8 cm x 92.2 cm x 152.4 cm)
Input	Rated Voltage	208 VAC
	Voltage Variation [4,5]	+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]
	Rated Frequency	50 / 60 Hz
	Input Cables required	3 phase ; 4 Wire + GND
	Dual Input Option Cables required	3 phase ; 4 Wire + GND
	Power Factor [1]	Greater than 0.98 when in inverter mode [1]
	Required Input kVA	28.0 kVA
	Walk-in Function	From 20% to 100% over 5 seconds
	Inrush Current	Less than 8 times the rated current under synchronous operation
	Current Limit	115% maximum
	Harmonic Currents [1]	Less than 3% THD [1]
Battery	DC Nominal (Voltage Range)	288 VDC (216 to 332 VDC)
	Float Charge (Regulation)	324.0 VDC (± 2%)
	Ripple Voltage	0.5 V R.M.S.
	Rated Back-up Time [2]	3 min at full load [2]
	Rated Charge Current	4.0 Amps
Output	Rated Voltage	208 / 120 VAC
	Rated Current	83.4 Amps
	Rated Power Factor	0.8 lagging
	Output Cables Required	3 phase ; 4 Wire + GND
	Voltage Regulation (phase-phase)	± 2% (0 – 100% balanced load); ± 3% (0 – 100% unbalanced load)
	Voltage Adjustment Range	± 5V Manually from the key pad
	Phase Displacement	± 2° (0 – 100% balanced load); ± 4° (unbalanced load)
	Rated Frequency	50 / 60 Hz
	Frequency Regulation	± 0.1% in free running mode
	Frequency Synchronous	± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician
	Frequency Slew Rate	1 Hz/s to 3Hz/s (in 0.5 Hz steps)
	Voltage Transients (Recovery time: 50 ms)	± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer of bypass to inverter)
	Inverter Overload Capacity	125% for 90 sec; 150% for 30 sec
	Bypass Overload Capacity	1000% for 10 ms; 125% for 10 min.
	Crest Factor	2.5 – 3.0 within the kW range
	Neutral Line Conductor	1.73 times line rating

	Harmonic Voltage Distortion	1.5% max (linear load)
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 89%
	Heat loss to be removed	See Table 5.10
	Audible Noise	60dB (A) at 1 meter from the front of the unit
	Operating Temperature	32 – 104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)
	Operating Humidity	30 – 90% RH (non condensing)
	Altitude [3]	Less than 6600 ft (2000 m) [3]

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 ºF (32 ºC).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 ºF (35 ºC).

7.6 4200*FA* 30 kVA w/Internal Transformer

	Model Number		**T42#3*300#AMXN, -S**
		Input	**# =(B: 208; H: 220; C: 240; N: 380–415 Δ-wye; P: 380–415 wye; D: 480; M: 600) VAC**
		Output	***=(F: 208; H: 220 wye; J: 240; P: 380–415 wye; K: 480 wye: M:600) VAC**
	Rated Output Capacity		**30 kVA**
	External Dimensions W x D x H (cm)		w/ casters: 20.0" x 36.3" x 59.7"(50.8 cm x 92.2 cm x 151.6 cm) w/o casters: 20.0" x 36.3" x 60.0"(50.8 cm x 92.2 cm x 152.4 cm)
Input	Rated Voltage		208; 220; 240; 380; 400; 415; 480; 600 VAC (Determined by Input Transformer internal to the unit)
	Voltage Variation [4,5]		+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]
	Rated Frequency		50/60 Hz
	Input Cables Required		3 phase ; 3 Wire + GND
	Dual Input Option Cables required		3 phase ; 4 Wire + GND
	Power Factor [1]		Greater than 0.98 when in inverter mode [1]
	Required Input kVA		30.5 kVA
	Walk-in Function		From 20% to 100% over 5 seconds
	Inrush Current		Less than 8 times the rated current under synchronous operation
	Current Limit		115% maximum
	Harmonic Currents [1]		Less than 3% THD [1]
Battery	DC Nominal (Voltage Range)		288 VDC (216 to 332 VDC)
	Float Charge (Regulation)		324.0 VDC (± 2%)
	Ripple Voltage		0.5 V R.M.S.
	Rated Back-up Time [2]		Refer to Battery System Manual [2]
	Rated Charge Current		10.0 Amps
Output	Rated Voltage		(Determined by Output Transformer internal to the unit)
	Rated Current		VA / Nominal Output Voltage / 1.73
	Rated Power Factor		0.8 lagging
	Output Cables Required		3 phase ; 4 Wire + GND
	Voltage Regulation (phase-phase)		± 5% (0 – 100% balanced load); ± 6% (0 – 100% unbalanced load)
	Voltage Adjustment Range		± 5V Manually from key pad
	Phase Displacement		± 2° (0 – 100% balanced load); ± 4° (unbalanced load)
	Rated Frequency		50 / 60 Hz
	Frequency Regulation		± 0.1% in free running mode
	Frequency Synchronous		± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician
	Frequency Slew Rate		1 Hz/s to 3Hz/s (in 0.5 Hz steps)
	Voltage Transients (Recovery time: 50 ms)		± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer from bypass to inverter)
	Inverter Overload Capacity		125% for 90 sec; 150% for 30 sec
	Bypass Overload Capacity		1000% for 10ms; 125% for 10 min.

	Crest Factor	2.5 – 3.0 within the kW range
	Neutral Line Conductor	1.73 times line rating
	Harmonic Voltage Distortion	1.5% max (linear load)
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 83%
	Heat loss to be removed	See Table 5.10
	Audible Noise	60dB (A) at 1 meter from the front of the unit
	Operating Temperature	32 – 104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)
	Operating Humidity	30 – 90% RH (non condensing)
	Altitude [3]	Less than 2000 meters [3]

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 ºF (32 ºC).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 ºF (35 ºC).

7.7 4200*FA* 50kVA @ 208 VAC Input/ 208 VAC Output - No Internal Batteries, No Internal Transformer

	Model Number	T42F3F500XAXXN T42F3F500XAMXN, -S T42F3F500FAMXN, -S
	Rated Output Capacity	**50 kVA**
	External Dimensions W x D x H (cm)	w/ casters: 35.5" X 38.3" X 59.3" (90.1 cm x 97.2 cm x 150.6 cm) w/o casters: 35.5" X 38.3" X 59.7" (90.1 cm x 97.2 cm x 151.6 cm)
Input	Rated Voltage	208 VAC
	Voltage Variation [4,5]	+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]
	Rated Frequency	50 / 60 Hz
	Input Cables Required	3 phase ; 4 Wire + GND
	Dual Input Option Cables required	3 phase ; 4 Wire + GND
	Power Factor [1]	Greater than 0.98 when in inverter mode [1]
	Required Input kVA	46 kVA
	Walk-in Function	From 20% to 100% over 5 seconds
	Inrush Current	Less than 8 times the rated current under synchronous operation
	Current Limit	115% maximum
	Harmonic Currents [1]	Less than 3% THD [1]
Battery	DC Nominal (Voltage Range)	288 VDC (216 to 332 VDC)
	Float Charge (Regulation)	324.0 VDC (± 2%)
	Ripple Voltage	0.5 V R.M.S.
	Rated Back-up Time [2]	Refer to Battery System Manual
	Rated Charge Current	11.5 Amps
Output	Rated Voltage	208 / 120 VAC
	Rated Current	138.9 Amps
	Rated Power Factor	0.8 lagging
	Output Cables Required	3 phase ; 4 Wire + GND
	Voltage Regulation (phase-phase)	± 2% (0 – 100% balanced load); ± 3% (0 – 100% unbalanced load)
	Voltage Adjustment Range	± 5V Manually from key pad
	Phase Displacement	± 2° (0 – 100% balanced load); ± 4° (unbalanced load)
	Rated Frequency	50 / 60 Hz
	Frequency Regulation	± 0.1% in free running mode
	Frequency Synchronous	± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician
	Frequency Slew Rate	1 Hz/s to 3Hz/s(in 0.5 Hz steps)
	Voltage Transients (Recovery time: 50 ms)	± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer from bypass to inverter)
	Inverter Overload Capacity	125% for 90 sec; 150% for 30 sec
	Bypass Overload Capacity	1000% for 10 ms; 125% for 10 min.
	Crest Factor	2.5 – 3.0 within the kW range

	Neutral Line Conductor	1.73 times line rating
	Harmonic Voltage Distortion	1.5% max (linear load)
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 89%
	Heat loss to be removed	See Table 5.10
	Audible Noise	~65dB @ 1 meter from the front of the unit
	Operating Temperature	32 – 104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)
	Operating Humidity	30 – 90% RH (non condensing)
	Altitude [3]	Less than 2000 meters [3]

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 °F (32 °C).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 °F (35 °C).

7.8 4200*FA* 50kVA @ 208 VAC Input/ 208 VAC Output w/Internal Batteries

	Model Number	T42F3F500XAXBN T42F3F500XAMBN T42F3F500FAMBN
	Rated Output Capacity	**50 kVA**
	External Dimensions W x D x H (cm)	w/ casters: 35.5" X 38.3" X 59.3" (90.1 cm x 97.2 cm x 150.6 cm) w/o casters: 35.5" X 38.3" X 59.7" (90.1 cm x 97.2 cm x 151.6 cm)
Input	Rated Voltage	208 VAC
	Voltage Variation [4,5]	+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]
	Rated Frequency	50 / 60 Hz
	Input Cables Required	3 phase ; 4 Wire + GND
	Dual Input Option Cables required	3 phase ; 4 Wire + GND
	Power Factor [1]	Greater than 0.98 when in inverter mode [1]
	Required Input kVA	46 kVA
	Walk-in Function	From 20% to 100% over 5 seconds
	Inrush Current	Less than 8 times the rated current under synchronous operation
	Current Limit	115% maximum
	Harmonic Currents [1]	Less than 3% THD [1]
Battery	DC Nominal (Voltage Range)	288 VDC (216 to 332 VDC)
	Float Charge (Regulation)	324.0 VDC (± 2%)
	Ripple Voltage	0.5 V R.M.S.
	Rated Back-up Time [2]	4.5 min. at full load [2]
	Rated Charge Current	11.5 Amps
Output	Rated Voltage	208 / 120 VAC
	Rated Current	138.9 Amps
	Rated Power Factor	0.8 lagging
	Output Cables Required	3 phase ; 4 Wire + GND
	Voltage Regulation (phase-phase)	± 2% (0 – 100% balanced load); ± 3% (0 – 100% unbalanced load)
	Voltage Adjustment Range	± 5V Manually from key pad
	Phase Displacement	± 2° (0 – 100% balanced load); ± 4° (unbalanced load)
	Rated Frequency	50 / 60 Hz
	Frequency Regulation	± 0.1% in free running mode
	Frequency Synchronous	± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician
	Frequency Slew Rate	1 Hz/s to 3Hz/s(in 0.5 Hz steps)
	Voltage Transients (Recovery time: 50 ms)	± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer from bypass to inverter)
	Inverter Overload Capacity	125% for 90 sec; 150% for 30 sec
	Bypass Overload Capacity	1000% for 10 ms; 125% for 10 min.
	Crest Factor	2.5 – 3.0 within the kW range
	Neutral Line Conductor	1.73 times line rating

	Harmonic Voltage Distortion	1.5% max (linear load)
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 89%
	Heat loss to be removed	See Table 5.10
	Audible Noise	~65dB @ 1 meter from the front of the unit
	Operating Temperature	32 – 104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)
	Operating Humidity	30 – 90% RH (non condensing)
	Altitude [3]	Less than 2000 meters [3]

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 ºF (32 ºC).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 ºF (35 ºC).

7.9 4200*FA* 50kVA w/Internal Transformer

	Model Number		**T42#3*500#AMXN, -S**
		Input	**# =(B: 208; H: 220; C: 240; N: 380–415 Δ-wye; P: 380–415 wye; D: 480; M: 600) VAC**
		Output	***=(F: 208; H: 220 wye; J: 240; P: 380–415 wye; K: 480 wye; M:600) VAC**
	Rated Output Capacity		**50 kVA**
	External Dimensions W x D x H (cm)		w/ casters: 35.5" X 38.3" X 59.3" (90.1 cm x 97.2 cm x 150.6 cm) w/o casters: 35.5" X 38.3" X 59.7" (90.1 cm x 97.2 cm x 151.6 cm)
Input	Rated Voltage		208 VAC
	Voltage Variation [4,5]		+10% to -15%; (-10% to -15%)[4], (-15 to -30%)[5]
	Rated Frequency		50 / 60 Hz
	Input Cables Required		3 phase ; 3 Wire + GND
	Dual Input Option Cables required		3 phase ; 4 Wire + GND
	Power Factor [1]		Greater than 0.98 when in inverter mode [1]
	Required Input kVA		50 kVA
	Walk-in Function		From 20% to 100% over 5 seconds
	Inrush Current		Less than 8 times the rated current under synchronous operation
	Current Limit		115% maximum
	Harmonic Currents [1]		Less than 3% THD [1]
Battery	DC Nominal (Voltage Range)		288 VDC (216 to 332 VDC)
	Float Charge (Regulation)		324.0 VDC (± 2%)
	Ripple Voltage		0.5 V R.M.S.
	Rated Back-up Time [2]		Refer to Battery System Manual [2]
	Rated Charge Current		11.5 Amps
Output	Rated Voltage		(Determined by Output Transformer internal to the unit)
	Rated Current		VA / Nominal Output Voltage / 1.73
	Rated Power Factor		0.8 lagging
	Output Cables Required		3 phase ; 4 Wire + GND
	Voltage Regulation (phase-phase)		± 2% (0 – 100% balanced load); ± 3% (0 – 100% unbalanced load)
	Voltage Adjustment Range		± 5V Manually from key pad
	Phase Displacement		± 2° (0 – 100% balanced load); ± 4° (unbalanced load)
	Rated Frequency		50 / 60 Hz
	Frequency Regulation		± 0.1% in free running mode
	Frequency Synchronous		± 0.5/1.0/1.5 Hz (± 1.0 Hz. std.) switch selectable by qualified technician
	Frequency Slew Rate		1 Hz/s to 3Hz/s(in 0.5 Hz steps)
	Voltage Transients (Recovery time: 50 ms)		± 5% (100% load step change); ± 3% (loss or return of input voltage); ± 8% (transfer from bypass to inverter)
	Inverter Overload Capacity		125% for 90 sec; 150% for 30 sec
	Bypass Overload Capacity		1000% for 10 ms; 125% for 10 min.

	Crest Factor	2.5 – 3.0 within the kW range
	Neutral Line Conductor	1.73 times line rating
	Harmonic Voltage Distortion	1.5% max (linear load)
	Inrush Current protection	Automatic Transfer to bypass, then retransfer to inverter
Environment	Efficiency (Typical)	AC/DC/AC – See Table 5.10, DC/AC: 85%
	Heat loss to be removed	See Table 5.10
	Audible Noise	~65dB @ 1 meter from the front of the unit
	Operating Temperature	32 – 104 °F (0 – 40 °C); optimal temperature is 77 °F (25 °C)
	Operating Humidity	30 – 90% RH (non condensing)
	Altitude [3]	Less than 2000 meters [3]

1 – Specified at rated conditions under balanced linear loads.

2 – Battery backup time may vary depending on the operating conditions and ambient temperature at the installation site. An initial charge time of 24 hrs is necessary to obtain proper battery performance level before the unit is placed in operation.

3 – At 6600 ft. (2000 m) above sea level, output capacity should be derated by 3% (Consult factory for higher elevations).

4 – Prolonged operation at this level requires derating of the maximum Operating Temperature to 90 ºF (32 ºC).

5 – SHORT TERM operation only (e.g. Brownouts). Operation at this level requires derating the maximum Operating Temperature to 95 ºF (35 ºC).

7.10 4200*FA* Efficiencies and Thermal Losses at Various Loads

The tables below list typical efficiency at 100% load, and thermal loss at various loads, for the 15/25/30/50kVA units in three configurations:

- UPS without input/output internal transformers
- UPS with Internal input isolation transformer
- UPS with internal input isolation transformer and autotransformer

(NOTE: The efficiencies and thermal values listed are representative only. Individual performance may be different due to variations in operating environment, manufacture, transformer type, and transformer performance at different loads.)

7.10.1 Efficiency with No Internal Transformers

4200FA Series	15 kVA Int Batt	25 kVA Int Batt	30 kVA Int Batt	50 kVA Int Batt
100% Load *	87.5%	89.2%	87.5%	88.3%

*Contact the factory for additional information on efficiency vs. load curves.

Table 7.1 Thermal Loss in BTU/Hr. at Load (No Internal Transformers)

4200FA Series	15 kVA Int Batt	25 kVA Int Batt	30 kVA Int Batt	50 kVA Int Batt
100% Load	5849	8262	11,699	18,085
75% Load	4875	6455	9096	14,356
50% Load	4134	4964	7339	12,232
25% Load	3304	3873	6150	8108
0% Load	1,798	2,409	2,890	3,722

7.10.2 Efficiency with Input Transformer

4200FA Series	15 kVA w/ 1 Xfmr	25 kVA w/1 Xfmr	3 kVA w/1 Xfmr	50 kVA w/ 1Xfmr
100% Load *	86.5%	88.2%	86.5%	86.5%

*Contact the factory for additional information on efficiency vs. load curves.

7.10.3 Thermal Loss in BTU/Hr. with Input Transformer

4200FA Series	15 kVA w/ 1 Xfmr	25 kVA w/1 Xfmr	30 kVA w/1 Xfmr	50 kVA w/ 1Xfmr
100% Load	6390	9130	12,781	21,301
75% Load	5250	7112	9915	16,802
50% Load	4403	5417	7857	13,878
25% Load	3449	4106	6430	8961
0% Load	2,730	4,077	4,892	6,403

7.10.4 Efficiency with Input and Output Transformer

4200FA Series	15 kVA w/ 2 Xfmr	25 kVA w/2 Xfmr	30 kVA w/2 Xfmr	50 kVA w/ 2 Xfmr
100% Load *	85.1%	86.7%	85.1%	85.8%

*Contact the factory for additional information on efficiency vs. load curves.

7.10.5 Thermal Loss in BTU/Hr. with Input and Output Transformers

4200FA Series	15 kVA w/ 2 Xfmr	25 kVA w/2 Xfmr	30 kVA w/2 Xfmr	50 kVA w/ 2 Xfmr
100% Load	7169	10,468	14,338	22,588
75% Load	5893	8125	11,904	17,641
50% Load	4833	6069	8746	14,567
25% Load	3691	4481	6897	9290
0% Load	2730	4,077	4,892	6,403

8 Operating the UPS

8.1 AC Input Mode (Normal Operation)

The following illustration shows circuit power flow when the UPS is operating normally in the AC Input Mode.

The converter of the UPS, including a boost chopper circuit, converts the AC input power into DC power. The boost chopper circuit maintains a constant voltage and provides current limiting for charging the batteries. It also supplies a DC voltage of the proper level to the inverter section. The inverter section generates a high quality sine wave output voltage. The batteries are maintained in a constantly charged state when the UPS is in the “Normal Operation Mode.”

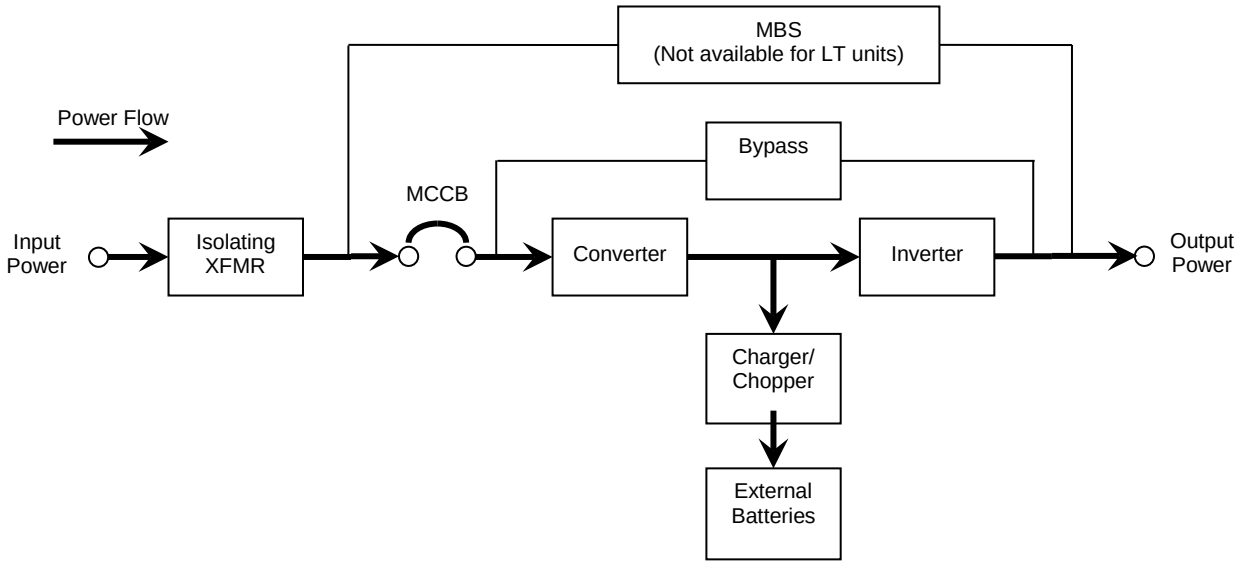


Figure 8-1 Power flow in AC Input Mode

8.2 Bypass Mode

If the UPS unit is severely overloaded or develops an internal fault, power flow is automatically switched from the main circuit to the Bypass circuit. Power flow through the bypass is shown in the following illustration.

This changeover occurs automatically in less than 4 milliseconds in phase (Make-Before-Break).

If the power flow is transferred to the Bypass circuit because of an overload, and that overload condition ends within a specified period of time, then the power flow will "re-transfer" to the AC Input Mode (Normal Operation) automatically.

If the power flow is transferred to the Bypass circuit due to a fault condition, then the power flow must be transferred manually from the UPS's Bypass circuit back to the Inverter circuit after repairing the fault (see "Start-up Procedure").

If the power flow is transferred to the Bypass circuit due to an overload condition, then the power flow will automatically transfer from the UPS's Bypass circuit back to the Inverter circuit after removing the overload (see "Overload Operation").

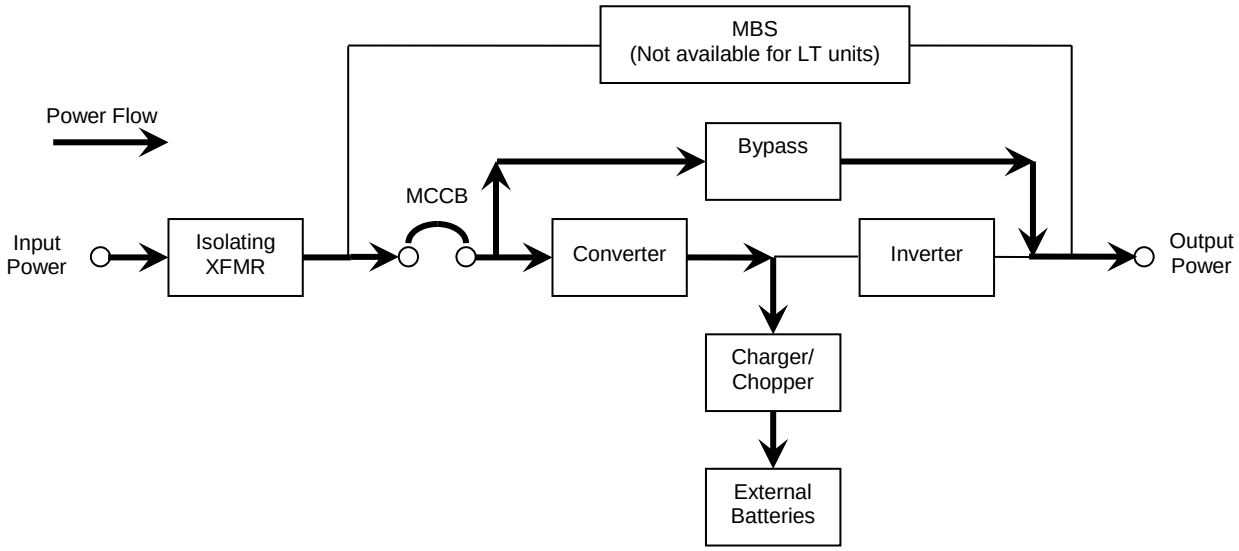


Figure 8-2 Power Flow in Bypass Mode

8.3 Bypass Mode for Optional Alternate Input Models

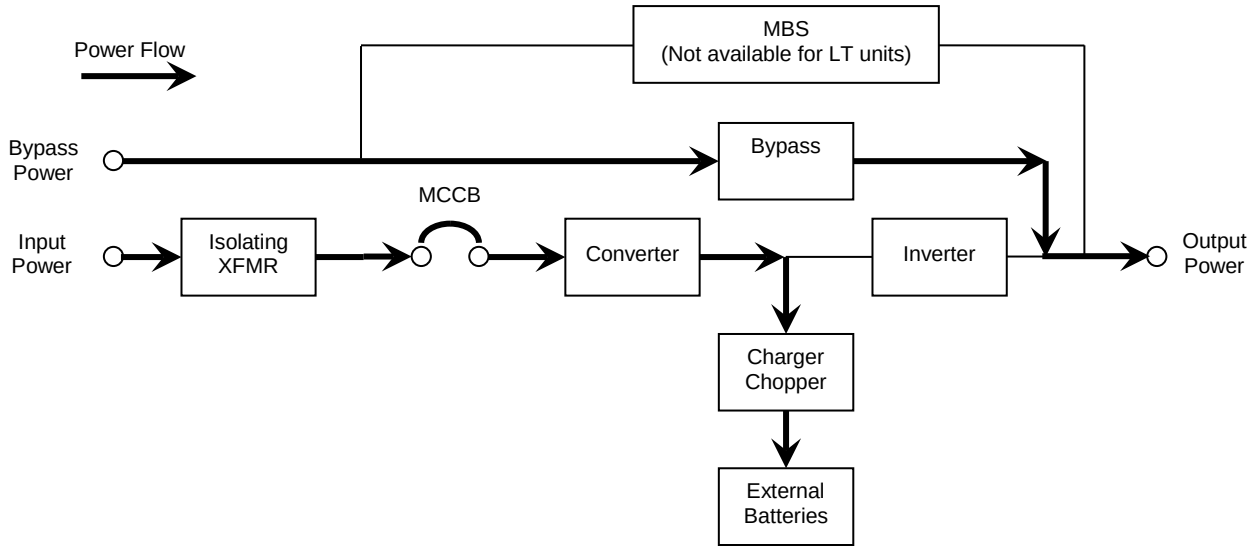


Figure 8-3 Power flow in Bypass mode for the Alternate Input Models

8.4 Battery Backup Mode

The following illustration shows power flow during the battery backup mode.

When commercial AC power failures occur, the batteries instantly begin supplying DC voltage to the main inverter circuit. This circuit inverts (hence; Inverter) the DC power into AC power. The AC power is available at the output.

This back-up process will continue until the battery voltage drops below a specific minimum level. When this occurs, the batteries will stop supplying power to the load. This minimum level is the rated minimum voltage (V min).

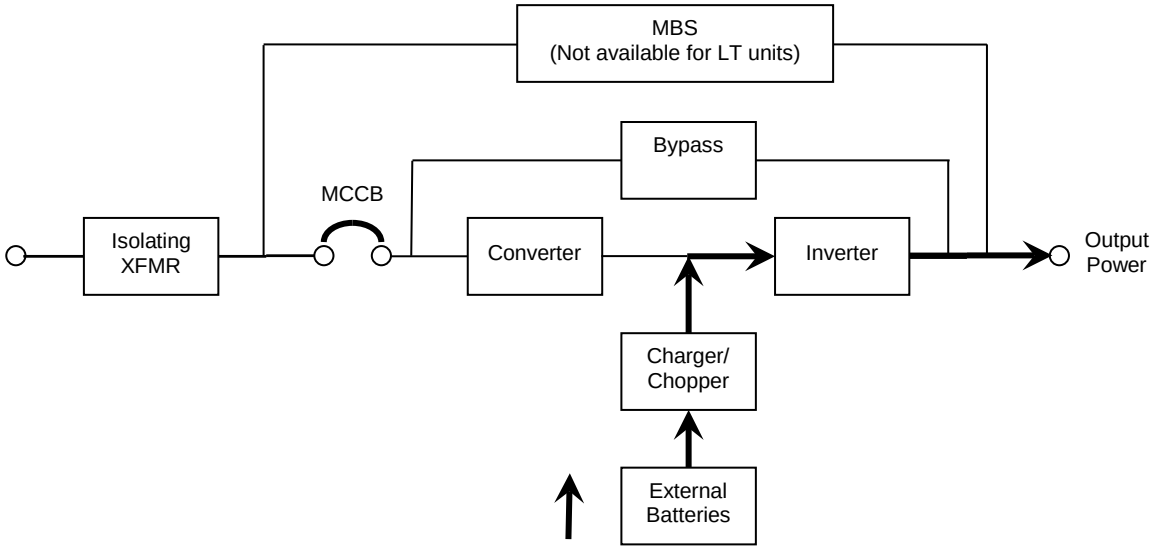


Figure 8-4 Power flow in battery backup mode

8.5 Battery Backup Time and Discharge Process

The UPS system, when used in conjunction with a TOSHIBA designed Battery System, is designed to provide several minutes of back-up time (Refer to the Battery System Manual for back-up times). These times are valid when the unit is operating under full load. When these models are operating at half load, the batteries can provide approximately 2 times the specified value. The exact length of these times will depend on the UPS model used, condition of the batteries, amount and type of load, temperature and other variables.

CAUTION Contact TOSHIBA when using other than TOSHIBA designed Battery Systems to determine proper compliance. Using other systems could void Warranty and or Safety Certifications.

The following illustration graphically shows the battery discharge process at full load conditions.

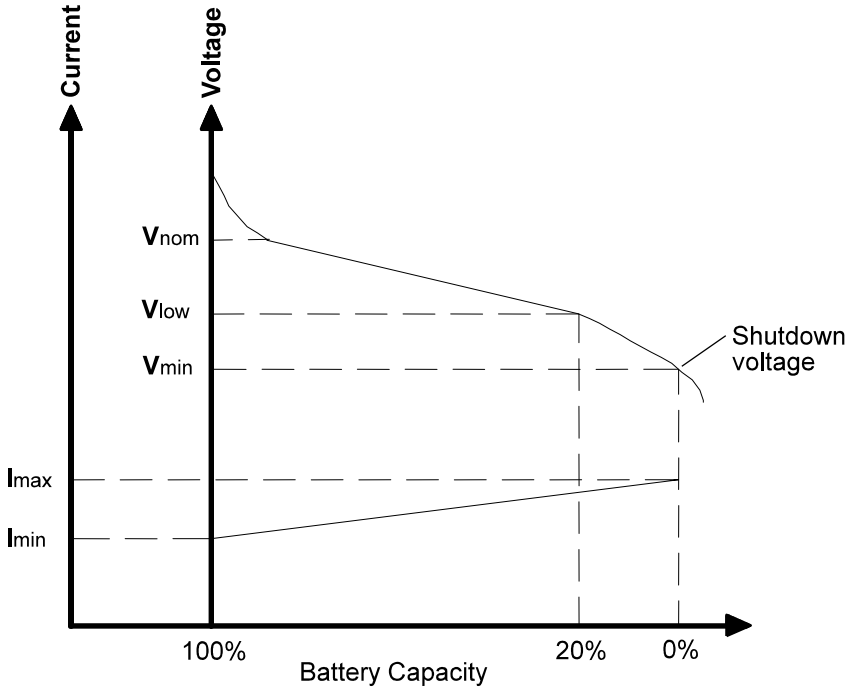


Figure 8-5 Battery Discharge Curve

8.6 Battery Low Voltage Tolerances

Excessive discharge will cause the UPS battery voltage to drop bellow tolerable levels. The chart shown below lists the voltage level at which each UPS unit's low-voltage alarm will sound, and also at what level the low-voltage condition will cause the unit to automatically shut down.

Models	Nominal Voltage	Alarm Voltage	Shutdown Voltage
15/25/30/50 kVA	288 VDC	252 VDC	216 VDC

8.7 Battery Recharging

The illustration below shows a graphical representation of the UPS battery recharge process after a full discharge.

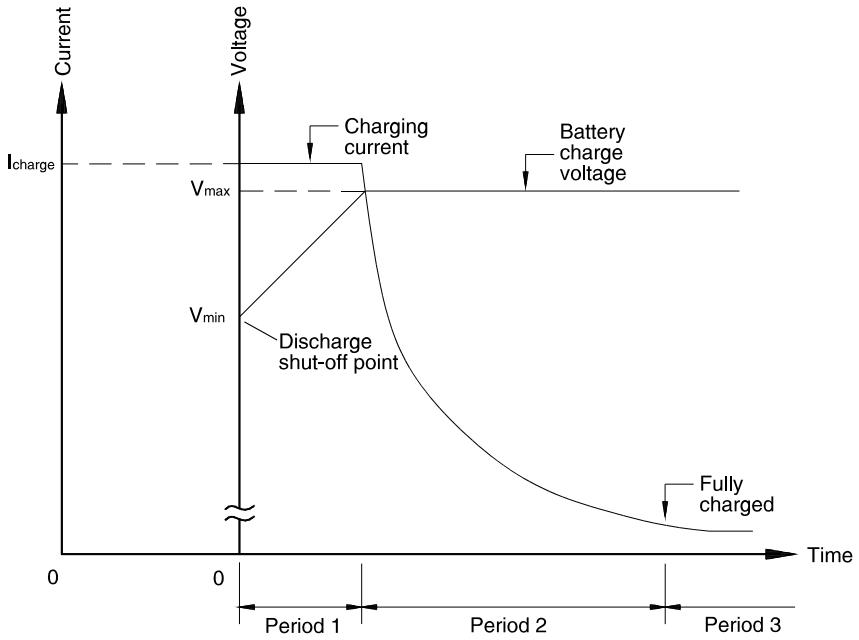


Figure 8-6 Battery Recharge Curve

The recharge process consists of three steps.

1. First, the charging current is maintained at approximately 4.0 amperes for the 15/25/30 kVA with internal batteries, 10.0 amperes for the 15/25/30 kVA with internal transformer and approximately 11.5 amperes for all 50 kVA models. This current is the maximum value that can be used to charge the batteries (for minimal recharge time) while assuring safety and long battery life.
2. Second, constant-voltage control starts and current gradually decreases as the batteries charge to their normal fully charged state.
3. Third, a slight "trickle" current continues to flow into the batteries to keep them fully charged and "floating" at the normal DC Voltage level. A full recharge usually requires approximately 24-72 hours (90% recharge in 10 X discharge time) after a complete discharge.

The following chart shows the rated maximum and minimum battery voltages, and the charge current for each of the sizes while the unit is maintained in a 75 °F (24 °C) ambient.

Rated Battery Voltages

Model	15/25/30 kVA		50 kVA	
	Internal Battery	Internal Transformer	Internal Battery	Internal Transformer
V float	324.0 VDC		324 VDC	
V min	216 VDC		216 VDC	
I charge	4.0 A	10.0 A	11.5 Amps	

9 Operator Interface

9.1 Front Panel Display Layout

The 4200FA UPS front panel is equipped with a Touchscreen display, three status LEDs, and three manual switches.

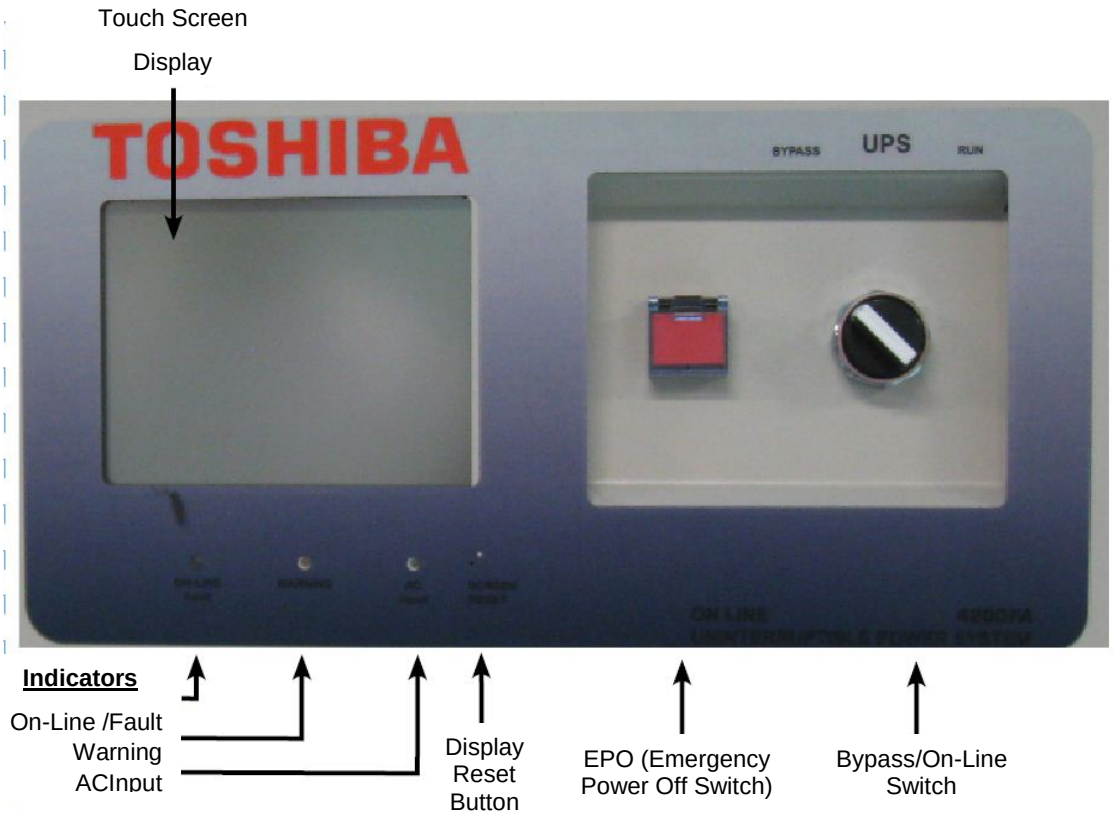


Figure 9-1 Panel Layout for Touchscreen Display

9.2 Display LEDs

Table 9.1 describes the front panel LED behaviors and the associated meaning.

Table 9.1 LED Behavior Key

LED	Behavior	Significance/Meaning
On-Line/ Fault	Green - ON	UPS is in On-Line, Backup, or Battery Test mode.
	Green - OFF	UPS in Bypass of Shutdown mode.
	Red - ON	One or more faults occurred. See *Records: Faults* for details.
	Red - OFF	No fault occurred.
Warning	Amber - ON	Service Call needed.
	Amber - Flashing	One or more Warnings occurred.
	Amber - OFF	No Warning occurred.
A/C Input	Green - ON	Input or Bypass voltage is within specified range.
	Green - Flashing	Input or Bypass voltage is over specified range.
	Green - OFF	Input or Bypass voltage is under specified range.

NOTE: On-Line/Fault LEDs - Appear Amber if Green and Red flash concurrently.

9.3 Operator Manual Controls

9.4 Bypass/Online Switch

Switches the UPS between On-Line and Bypass modes.

9.5 EPO (Emergency Power Off) Function

These units are equipped with a front panel mounted EPO switch.

This safety feature enables quick shutdown of the UPS AC output and battery circuits.

The EPO function is initiated by pressing the switch to the closed “shutdown” position. The effect of using the EPO switch is the same whether the UPS is in the AC Input Mode, Battery Backup Mode, or the Bypass Mode. See ‘EMERGENCY OFF’ screen.

The following figure shows the UPS condition after application of the EPO switch. Use the Start-up Procedure for restarting the unit.

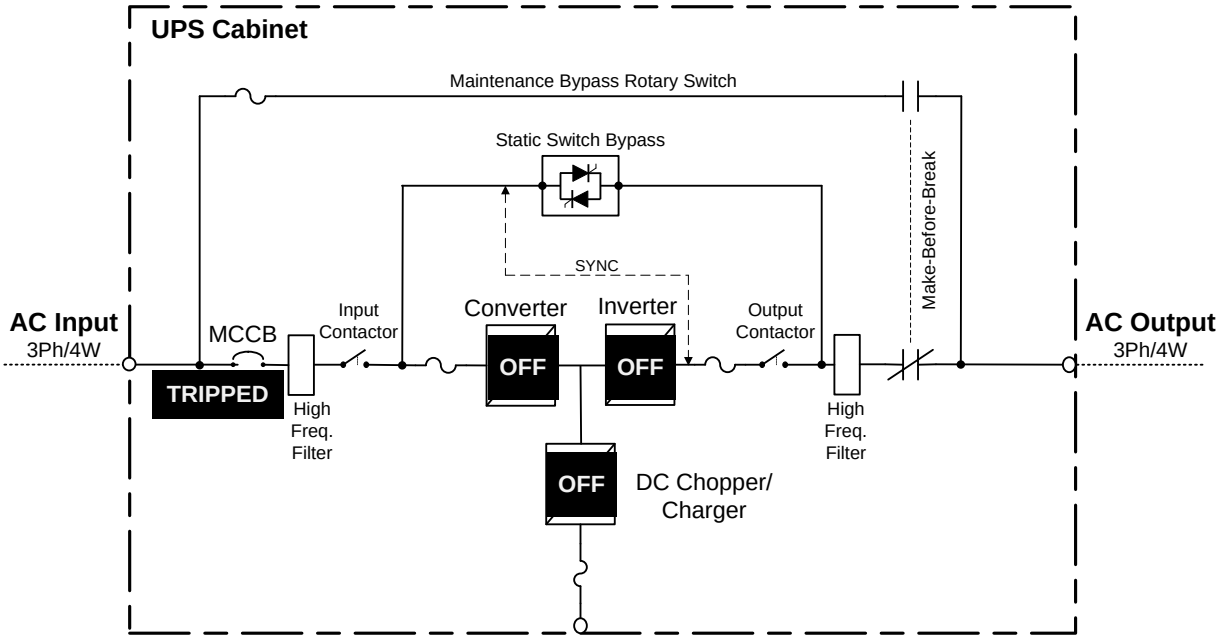


Figure 9-2 Effect of EPO Activation

9.5.1 Display Reset Switch

The Display Reset Switch allows the display to be rebooted without powering down the UPS. The display can be reset by pressing the Reset Switch with a thin probe, such as a paper clip.

NOTE: Press the reset button for at least 2 seconds to reset the display.
The display may not respond if the button press is too short.

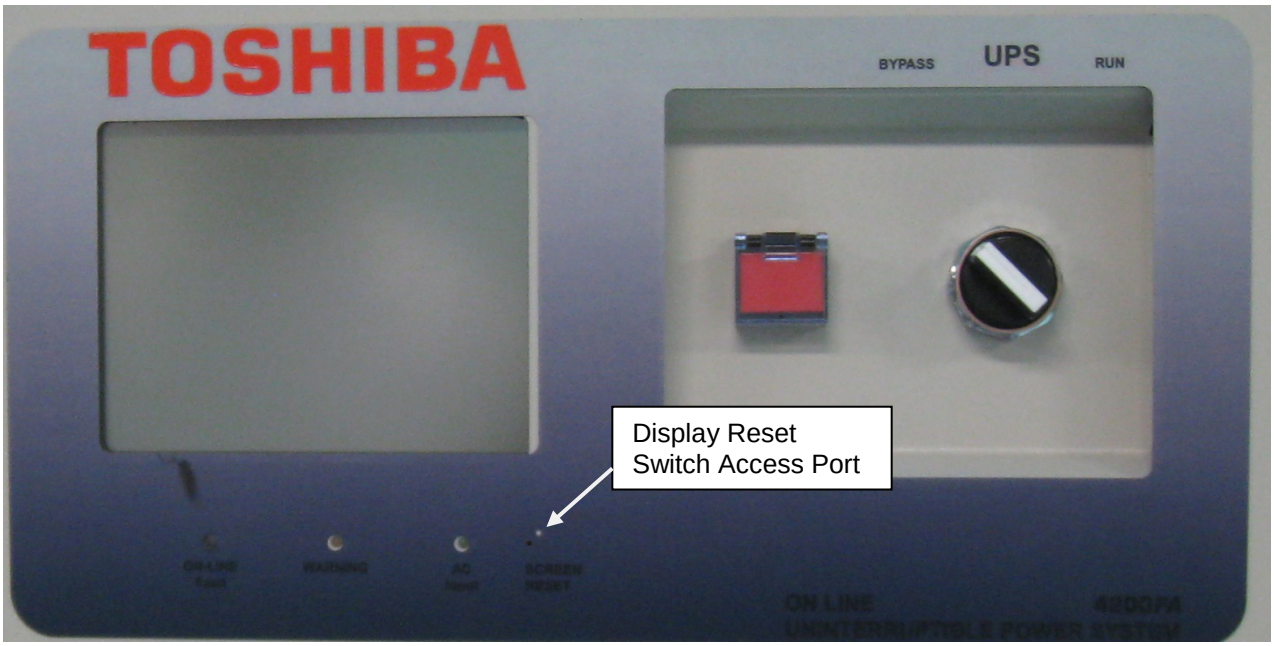


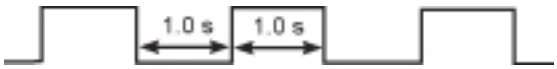
Figure 9-3 Display Reset Switch

9.6 Audible Alarm Functions

An audible alarm (buzzer) will sound when the UPS is in the battery backup mode, has a fault, has low battery voltage, or is in an overload condition. The buzzer will also beep each time an effective item is touched on the touchscreen. The following chart shows the buzzer pattern durations for each condition. Time units are shown in seconds.

Table 9.2 AUDIBLE ALARMS

Condition	Audible Pattern
Any Fault (Intermittent buzz until fault clears)	
Switch to Backup (Single five-second buzz)	
Backup Operation (Intermittent buzz once every ten seconds)	
UPS Battery Shutdown Voltage (Batt. Voltage 79% Normal)	

Warnings: OL110 (Overload Timer) LB (Low Battery - Batt. Voltage 90% Normal) BLFN (Battery Life Pre-alarm - Batt expires in 6 mo.) BLFE (Battery Life End) CHRGOV (Charger Over Voltage) BTSTFL (Battery Test Fail) BOH (Battery Overheat) AOH (Ambient Overheat) CLMT (Current Limit) DCER (Display Disconnected) BDEPL (Battery Depletion)	
Touching Effective Item on Touchscreen	

The buzzer can be silenced most easily by pressing the Buzzer Silent button on the Quick Access Toolbar.

Alternatively, the buzzer can also be silenced by selecting the Settings tab, and then set the **Buzzer Silent** parameter to “Disable.”

This will turn off the buzzer for the current alarm status, but the buzzer will still sound when the next Fault/Warning condition occurs.

The buzzer can be disabled permanently by selecting the Settings tab then setting the parameter **Buzzer Disable** to Disable. This will disable the alarm so that no alarm sounds for any Fault or Warning condition.

9.7 Touch Screen Display

The various components of the touchscreen display are identified in Figure 9-4

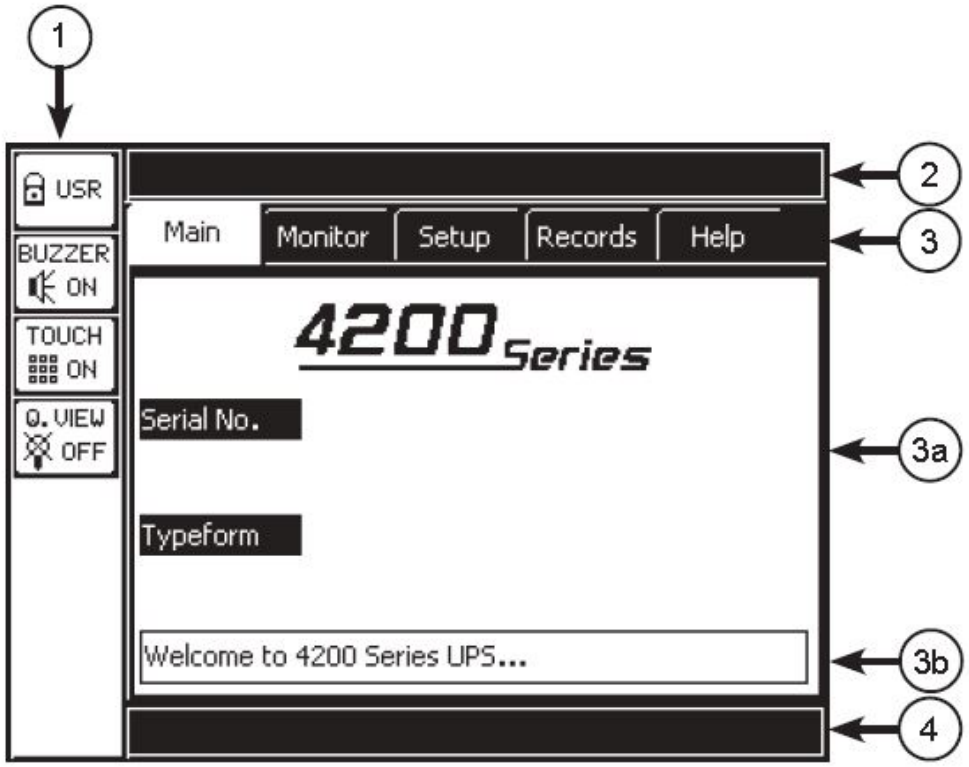


Figure 9-4 Touch Screen Layout

Table 9.3 Touch Screen Layout Components (Initial Main Display)

Touchscreen Layout	
No.	**Function**
1	**Quick Access Toolbar** - Interface/Status Switches (push-button icon changes to reflect current status)
2	**Header Bar** - Displays system load, status, and time.
3	**Menu TABS** - Top level menu. Touch a Tab to activate the display mode
3a	Data display area
3b	Update - Displays current status and operation hints.
4	**Footer Bar** - Displays Faults, Warnings, and UPS Operating Mode.

9.8 Header Bar

The Header Bar on the graphic display panel displays three system parameters: the System Load, Current Status, and System Time.

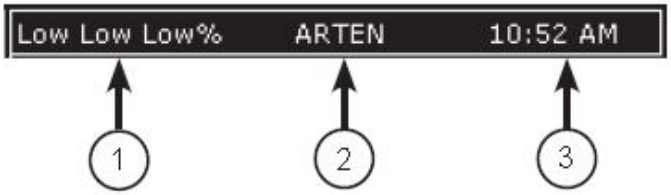


Figure 9-5 Header Bar Detail

Table 9.4 Header Bar Components

Header Bar Components	
No.	**Function**
1	**System Load** - Load per each phase as percent of full load. Low - Less than 10% Load.
2	**Current Status** - UPS status at the moment. (Status is delayed by a few seconds)
3	**System Time** - Current time in AM-PM format

9.9 Footer Bar

The Footer Bar on the graphic display panel displays three system parameters:

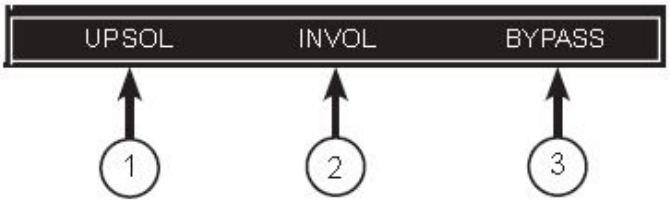


Figure 9-6 Footer Bar Detail

Table 9.5 Footer Bar Components

Footer Bar Components	
No.	**Function**
1	**Fault** - Displays last fault sensed by UPS. A Fault causes the UPS to switch to bypass and it will not automatically reset.
2	**Warning** - Displays last warning sensed by UPS. Multiple frequent warnings of the same type may induce a fault condition.
3	**UPS Mode** - Selected operating mode.

9.10 Touch Screen Controls

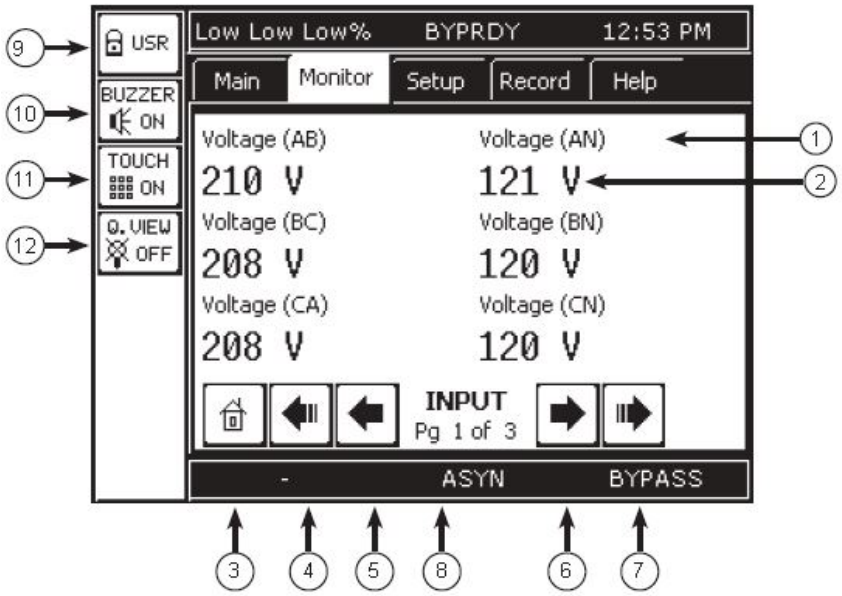


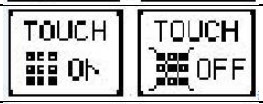
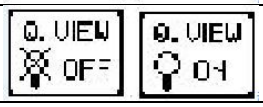
Figure 9-7 Monitor Display Layout

Table 9.6 Monitor Touch Screen Controls -

Touch Screen Controls	
No.	**Function**
Display	
1	Parameter Description
2	Parameter Value
Navigation Bar	
3	Home
4	Go To First Page
5	Go To Previous Page
6	Go To Next Page
7	Go To Last Page
8	Parameter Type (Input, Output, Communication, DC) and Pages of Data.
Quick Access Toolbar	
9	Security Level (USR, ADM)
10	Warning Buzzer Switch/Status (press for ON, press again for OFF)
11	Touchscreen Enable/Disable
12	Quick View Selector (press for Quick View, press again for Normal View)

The Quick Access Toolbar allows the operator easily perform routine commands. The Quick Access ToolBar buttons and their function are listed in Table 9.7.

Table 9.7 Quick Access Toolbar Controls

Quick Access Toolbar Controls	
No.	**Function**
	Security/Access Level - Access levels are: USR, ADM
	Warning Buzzer mute. Press to silence buzzer. Buzzer will sound again at next fault event. (To silence buzzer for all fault events set to “Disable”.)
	Touch Screen ON/OFF button. Press to toggle between ON and OFF. • ON enables all touchscreen active areas. • OFF disables all touchscreen areas except the TOUCH button.
	Quick View On/Off Selector - Press to toggle between Normal view and Quick view. Quick view displays a simultaneous summary of the Input/Output/Bypass/DC Voltages and Currents

9.11 4200FA Touchscreen Menu Tree

Below is a menu tree for the 4200FA touchscreen display.

- Quick Access Toolbar buttons allow immediate control of important functions.
- Menu Tabs allow access to varying degrees of detailed information concerning the UPS operation, performance and parameters. The degree of information available is determined by the Security mode, which can be changed pressing the top Quick Access Toolbar button and entering the appropriate password.

(Quick Access Toolbar Buttons)

ADM - Security Mode: USR and ADM

BUZZER ON - Toggles between BUZZER ON, BUZZER OFF

TOUCH ON - Toggles between enabling and disabling the touchscreen.

Q. VIEW ON - Toggles between Quick View and standard view (Q. VIEW OFF)

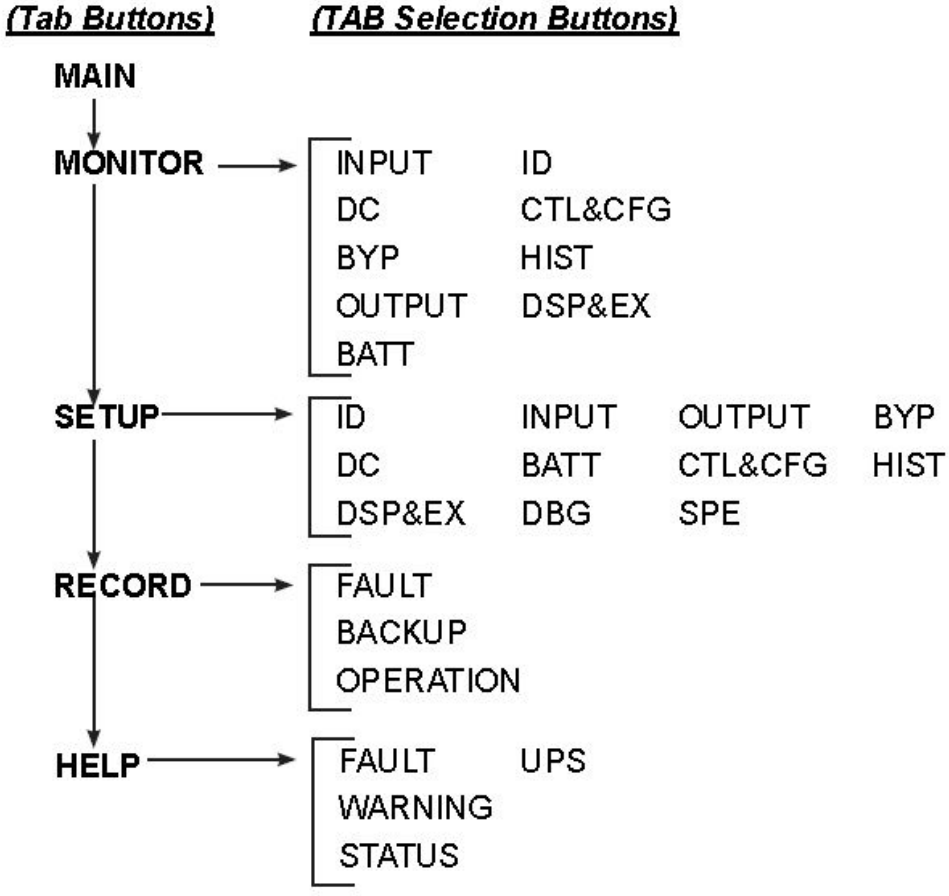


Figure 9-8 Menu Tree

9.12 Toolbar: Security

The UPS initializes in the USR, or lowest security mode. To change the display security level, press the Security button.

The screen displays an alpha/numeric keypad to enter the appropriate password for the desired security level. The UPS ships with a default ADM password of ADMIN.

In the example below, to change the security level from USR to ADM:

1. Press the Security button. The alpha/numeric keypad is displayed.
2. Type in the ADM password “ADMIN” - Press the ABC button once for A, twice rapidly for B, etc.
3. After entering the password, press WRITE.
4. If the password is accepted the display will show “Successful”. Press QUIT to return to the Main display, and the Security button will display the ADM security level.
   If the password is not accepted, the screen will return to the Main display and the Security button will display the USR level.

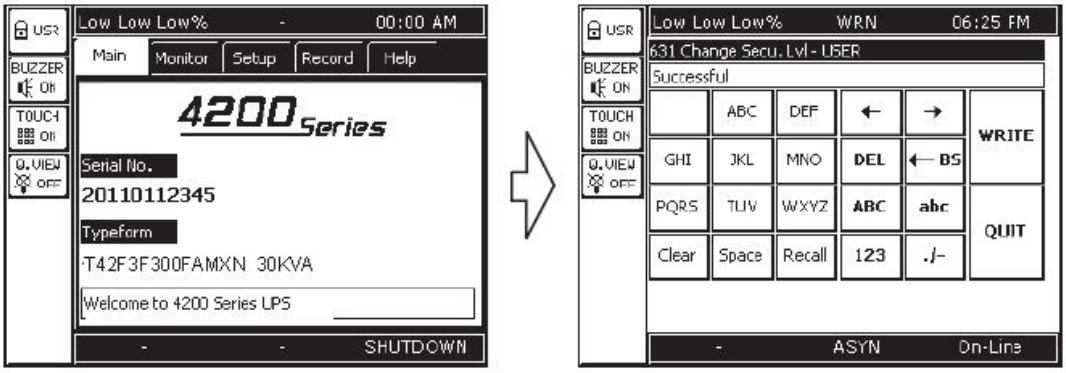


Figure 9-9 Changing Security Level

9.13 Toolbar: Buzzer ON/OFF

The UPS Buzzer sounds when a fault occurs or when the UPS is switched to backup mode. The Toolbar allows the user to turn on/off the buzzer.

The buzzer can also be enabled or disabled through the setup menu. If the Buzzer is disabled through the setup menu, the Toolbar Buzzer button will be disabled.

9.14 Toolbar: Touch ON/OFF

The touchscreen can be turned OFF (locked) by pressing the TOUCH ON/OFF button. With TOUCH OFF, only the TOUCH button is active, the rest of the display will not respond to touch.

9.15 Toolbar: QUICK VIEW ON/OFF

At anytime while using the tabs to view system details, the summary of the UPS Input, Output, and DC Bus can be viewed by pressing the Q. VIEW button (Button will display Q. VIEW ON). The illustration below highlights the critical features of the Quick View display.

Exit Quick View by pressing the Q. VIEW button again. (Button will display Q. VIEW OFF)

Table 9.8 Quick View Display Layout

No.	Description
1	Displays Vin, Vout, and Vbyp for all three phases
2	Changes voltage display mode: Press repeatedly to display sequentially the voltage as: Line-to-Line (LL), Line-to-Neutral (LN), and Voltage as a % of rated Voltage (%). The highlighted icon indicates the voltage display mode.
3	Displays output current for all three phases.
4	Changes current display mode: Press repeatedly to display alternately the current in Amps (A), or as a % of rated current (%). The highlighted icon indicates the current display mode.
5	Displays DC Bus voltage, Battery voltage, and Battery discharge current.

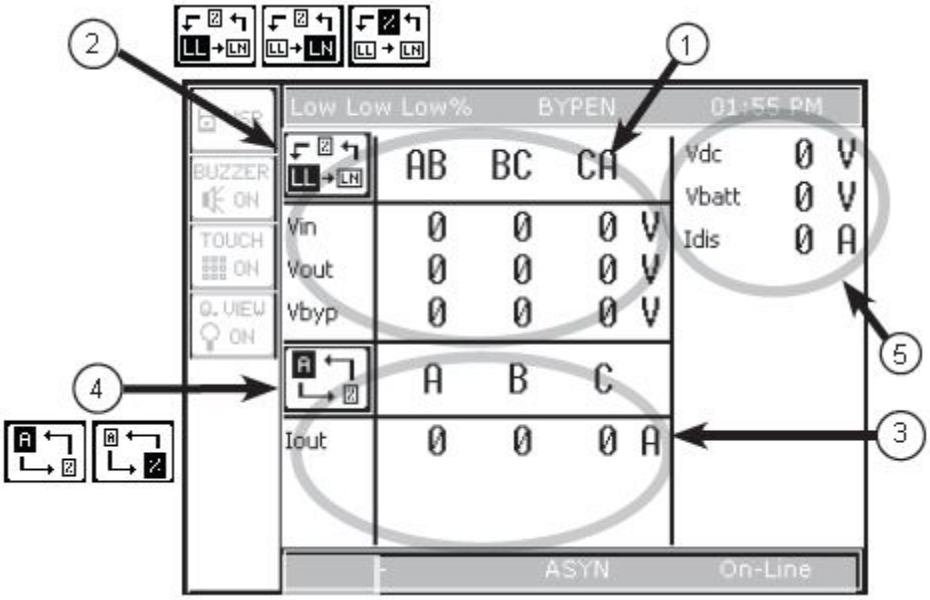


Figure 9-10 Quick View Display Layout

9.16 MAIN Tab

The Main tab displays the UPS Serial Number and Typeform.

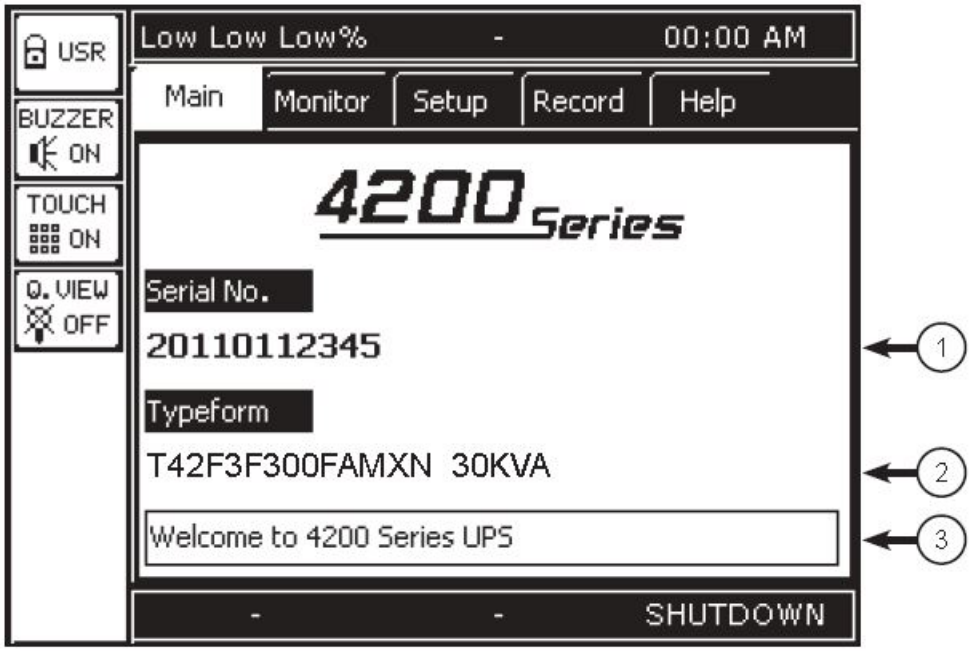


Figure 9-11 MAIN Tab

Table 9.9 MAIN Tab Components

No.	Function
1	Serial Number - UPS Serial Number
2	Typeform - UPS typeform
3	Information Bar - Randomly displays status, helpful hints, and acronym definitions every two seconds.

9.17 MONITOR Tab

The MONITOR tab allows the user to select a specific group of performance parameters to view; Input, Output, Bypass, DC Link, ID, Control and Configuration, History, and Display and External Communications (RemotEye).

The right side of the display is a vertical stack of five buttons: 4 active and 1 reserved for future use.

The middle of the display contains five buttons arranged in a diagram representing the functional model of the UPS. The lines connecting the mimic buttons represent the power flow from input to output. A thin line indicates no current flow, and a thick or bold line indicates current flow. See the Mimic Display current Flow Indicator illustration on the following page.

Figure 9-12 illustrates the data displayed when the corresponding button is pressed.

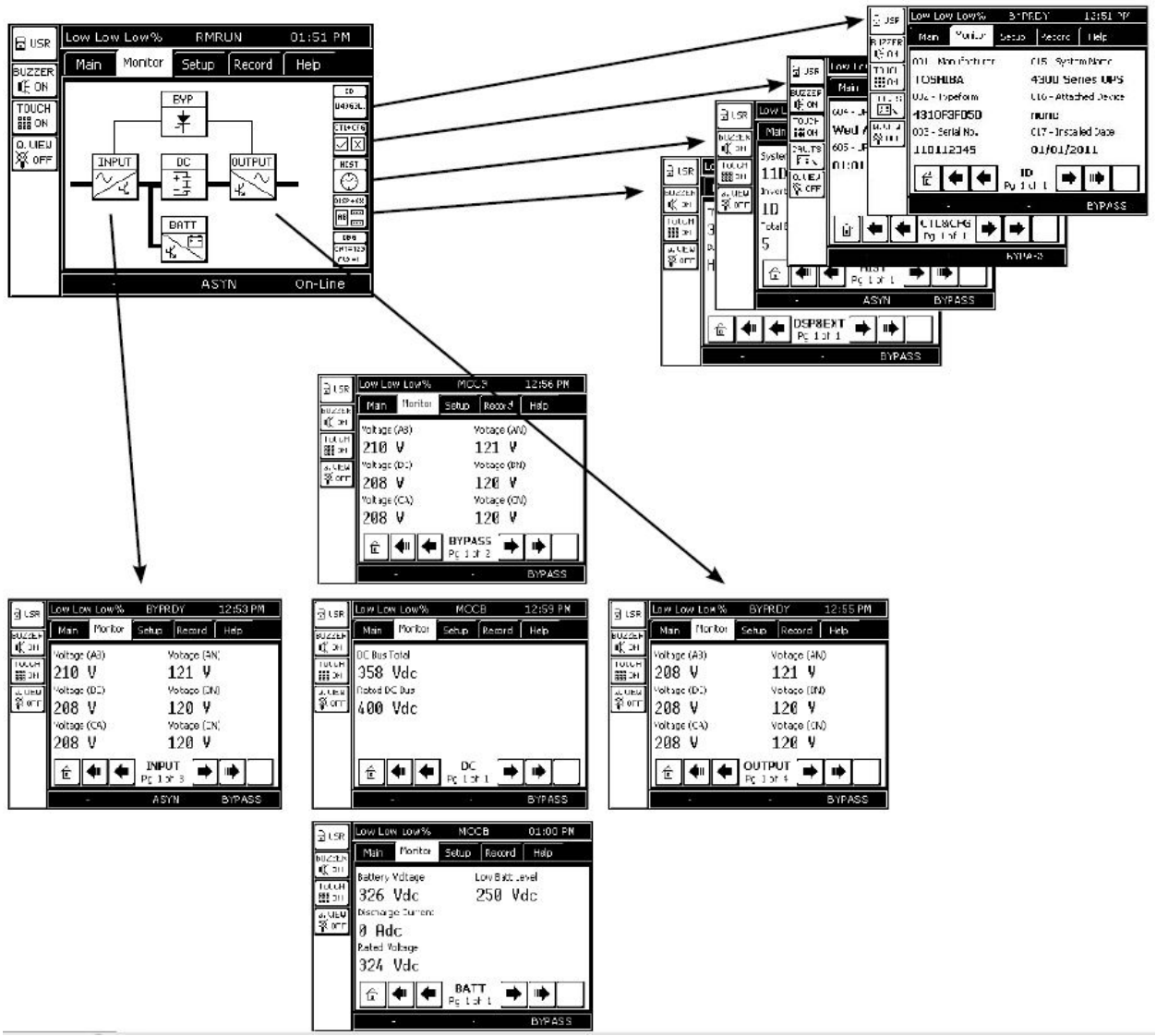


Figure 9-12 Monitor Tab Display Options

The mimic display indicates the power flow through, or around, the UPS. There are four possible modes the UPS operates in: Off, Bypass, On-Line, and Backup. Figure 9-13 illustrates the display for each of these modes.

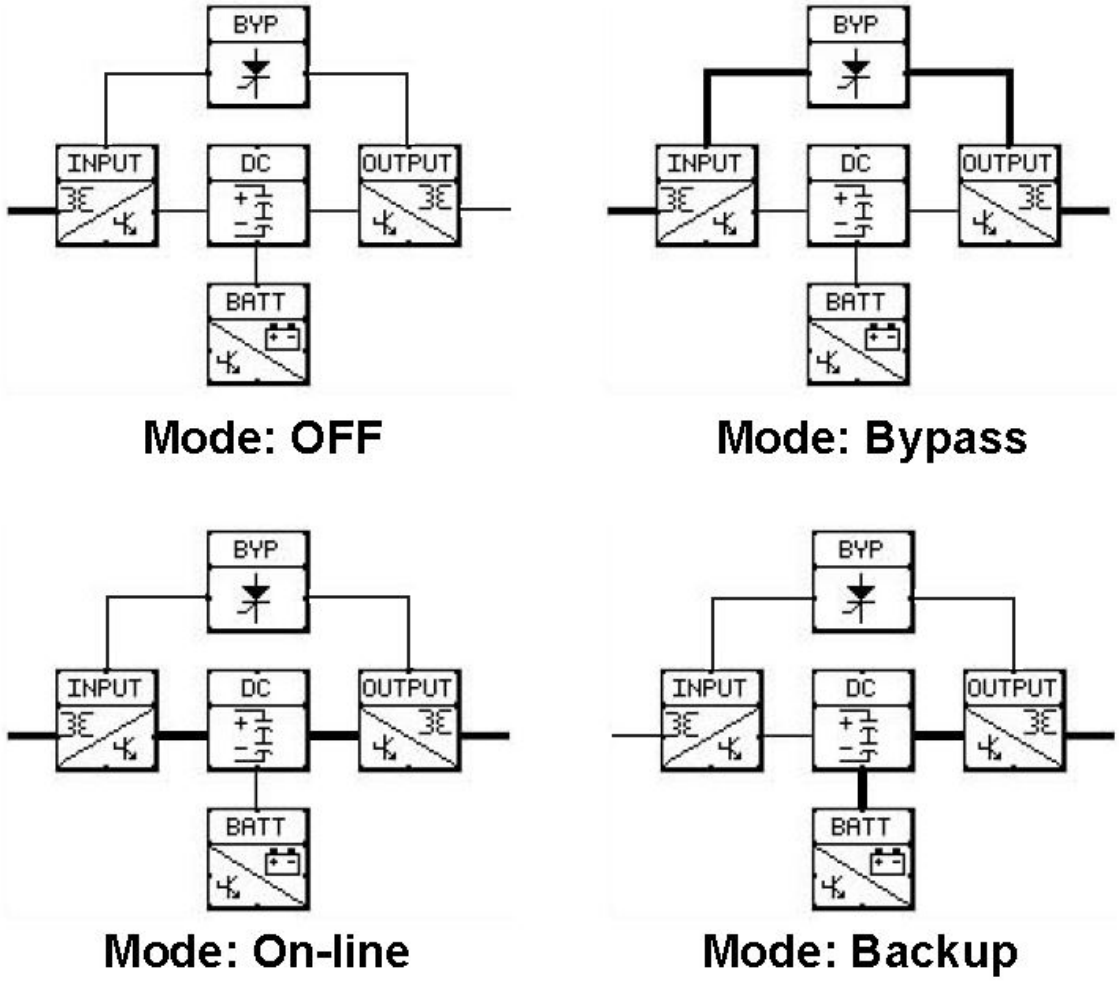
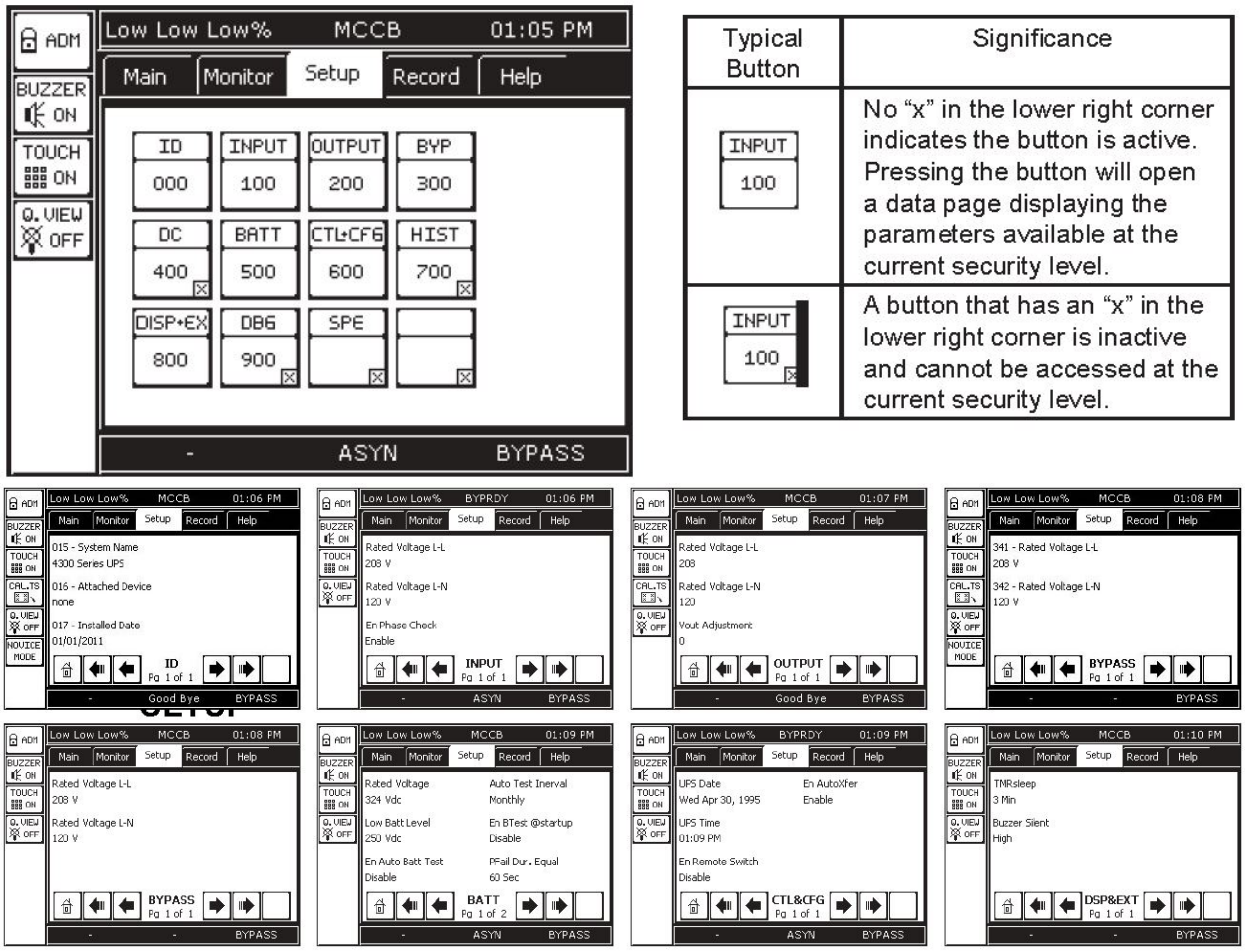


Figure 9-13 Mimic Display Current Flow Indicator

9.18 SETUP Tab

The SETUP tab allows the user to adjust certain UPS parameters. The setup tab shows 12 buttons. Inactive buttons are indicated with a “x” in the lower right-hand corner of the button. Figure 9-14, right, shows a typical SETUP button.



Typical Button	Significance
INPUT 100	No "x" in the lower right corner indicates the button is active. Pressing the button will open a data page displaying the parameters available at the current security level.
INPUT 100	A button that has an "x" in the lower right corner is inactive and cannot be accessed at the current security level.

Figure 9-14 Setup Tab

Table 9.10 Setup Parameter Categories

Param. Prefix	Parameter Category
0	UPS Identification, Serial number, Start-up Date, software version
1	Input line-line and line-neutral V/I values, V/I percent of rated value, and frequency
2	Output line-line and line-neutral V/I values, V/I percent of rated value, and frequency
3	Bypass line-line and line-neutral V/I values, V/I percent of rated value, and frequency
4	DC Bus Voltage, DC Under Voltage Level, Startup Voltage Level
5	Battery Voltage/Current, shutdown voltage, battery test enable
6	Control and Configuration - UPS time/date/status, faults, warnings, password management
7	UPS Operation time, Number of Faults, Backup, Operations.
8	Display and Ext Comm. - Disp. S/W version, buzzer status, display calibration values. RemotEye I/P address, data and network status.

Pressing an active button will cause a list of parameters to be displayed (See previous page). Pressing a listed parameter will activate a display appropriate to the parameter selections available If the parameter cannot be edited at the current security level, the display will not change. If the parameter can be edited

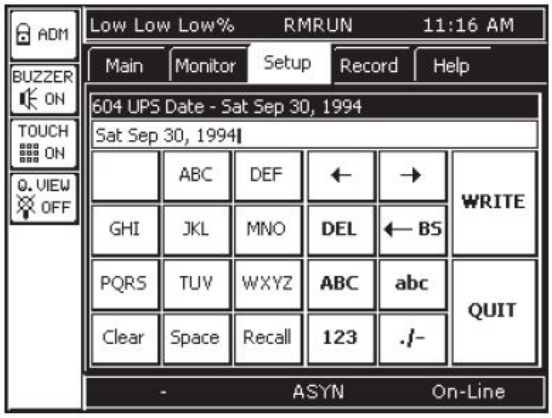
or changed, an appropriate keypad will displayed as shown below. Either a alpha/numeric keypad, a multiple choice, or binary choice display will appear.

After entering data or selecting an option, press WRITE to save the selections, or QUIT to leave the current value unchanged.

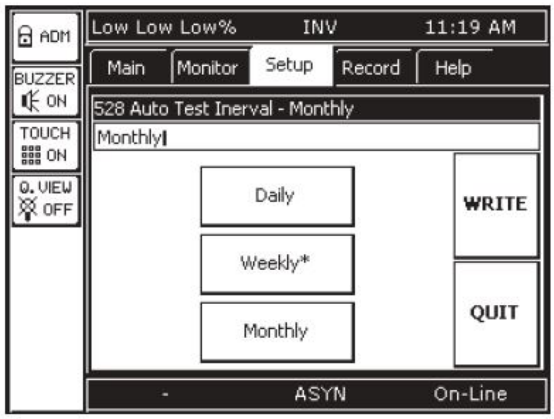
Table 9.11 Touchscreen Kleypad Identification

Button	Action
Clear	Delete all characters on input line
Space	(Space Bar)
Recall	Restores previously entered value
← →	Move cursor one space left or right
DEL	Delete character to right of cursor
← BS	Back Space – Delete character to left of cursor
ABC	Set Keypad to upper case letters (A, B, C…)
abc	Set Keypad to lower case letters (a, b, c…)
123	Set Keypad to write
,/-	Set Keypad to write special characters (, - : /)
Write	Write information (Enter) (Pressing Quit without first pressing Write will cause the newly entered data to be lost.
Quit	Exit Keypad

Example 1 - Alpha/numeric display.



Example 2 - Multiple Choice Display with Default value Marked (*)



Example 3 - Binary choice (On/Off, Enable/Disable, Contact A/Contact B)

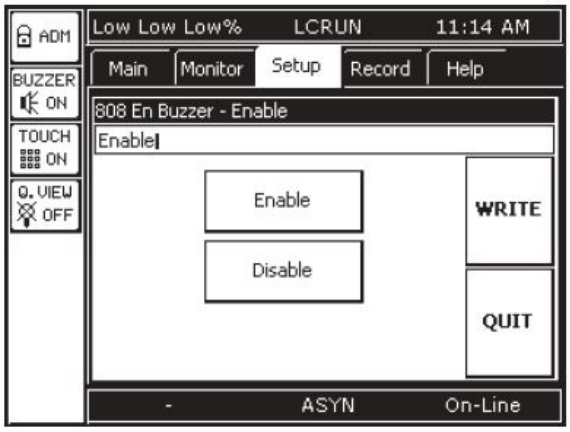


Figure 9-15 Setup Keypad

9.19 Setup: Calibrating the Touchscreen

At any time while using the tabs to view system details, the touchscreen can be calibrated by executing the built-in calibration routine.

To calibrate the touchscreen:

Press the **Setup** Tab.

Press the **DISP-EX 800** button

Press the entry **Cali** to begin the calibration routine

Follow the directions on the display to press the "+" at each location it flashes on the display.

To exit the calibration routine press QUIT at any time. (See Figure 9-16.)

After the touchscreen has been recalibrated, the display will indicate that the calibration routine has passed.

Press Quit to return to the main display. (See Figure 9-16 - C.)

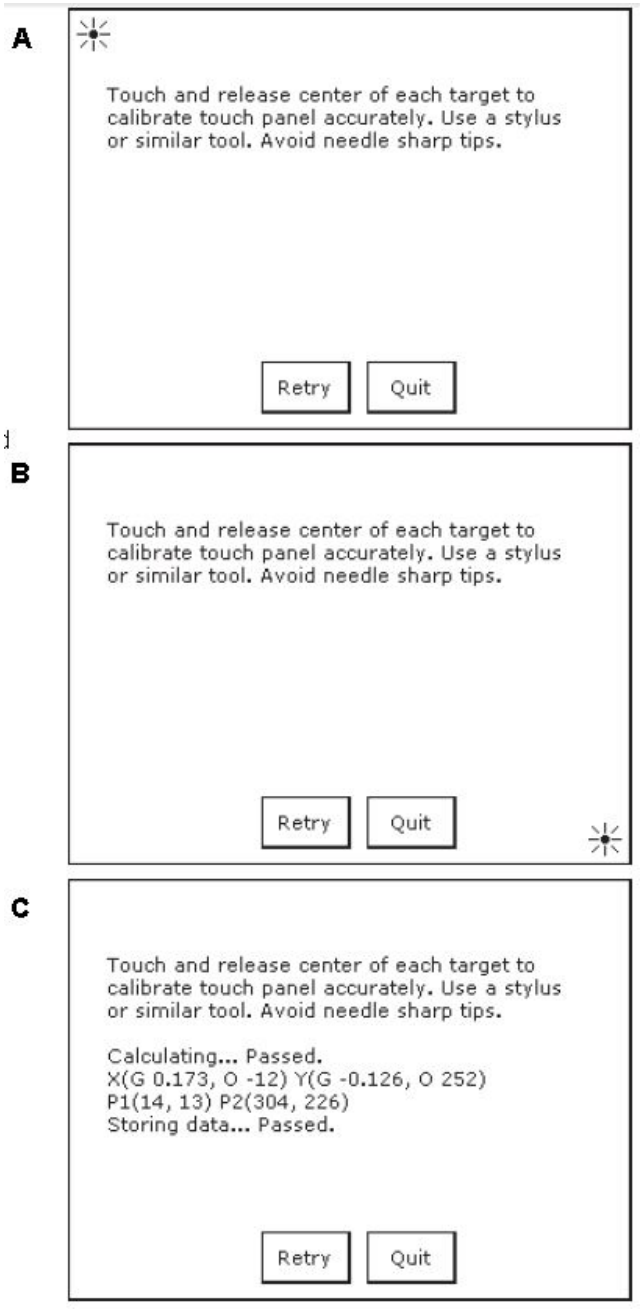

A
Touch and release center of each target to calibrate touch panel accurately. Use a stylus or similar tool. Avoid needle sharp tips.
Retry
Quit
B
Touch and release center of each target to calibrate touch panel accurately. Use a stylus or similar tool. Avoid needle sharp tips.
Retry
Quit
C
Touch and release center of each target to calibrate touch panel accurately. Use a stylus or similar tool. Avoid needle sharp tips.
Calculating... Passed.
X(G 0.173, O -12) Y(G -0.126, O 252)
P1(14, 13) P2(304, 226)
Storing data... Passed.
Retry
Quit

Figure 9-16 Touch Screen Calibration

9.20 RECORD Tab

The tab Record offers three types of records: Operation, Backup, and Fault.

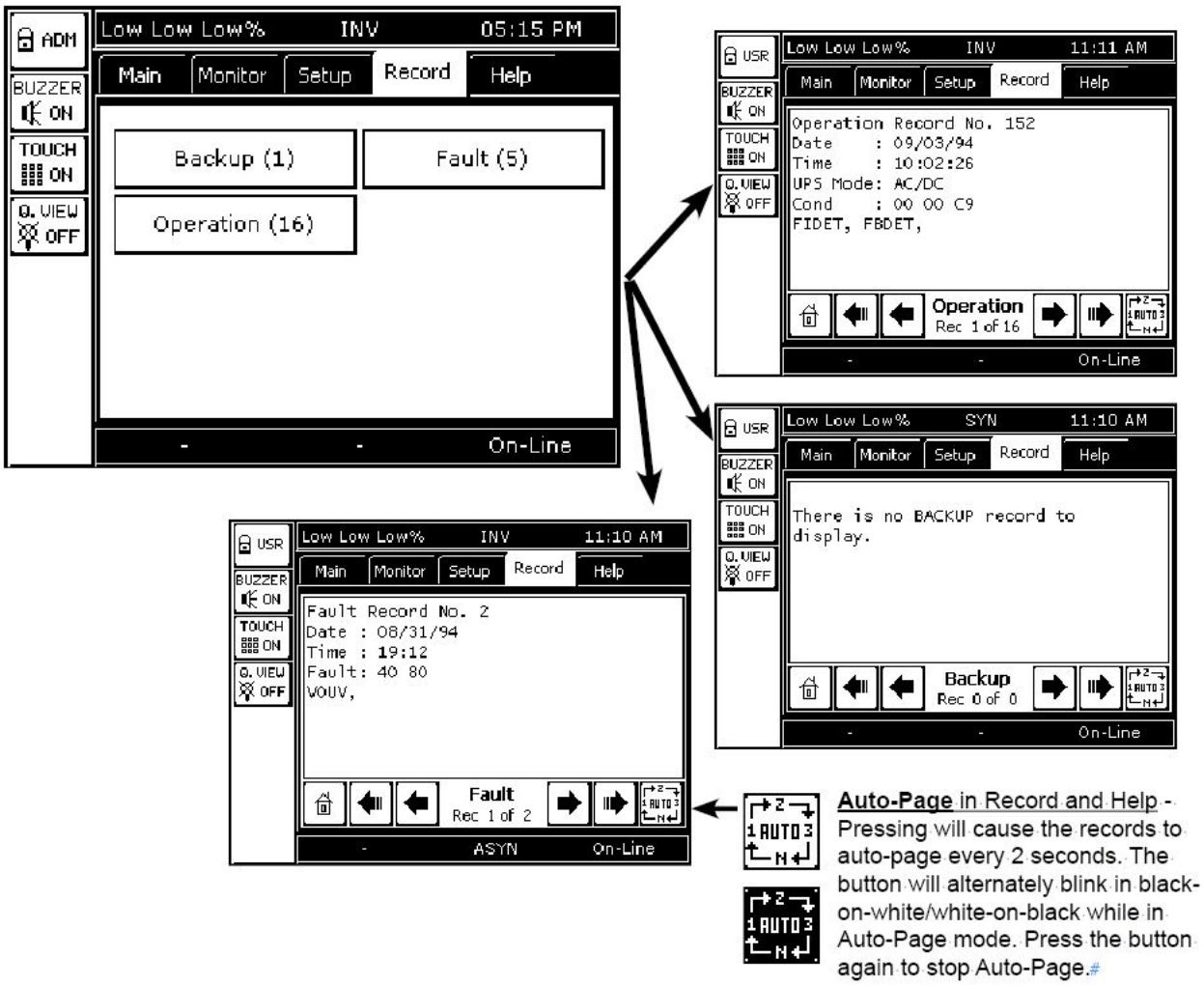


Figure 9-17 RECORD Tab Layout

Table 9.12 RECORD Tab Description

Backup Record	Description	Max. Number of Records
Operation	Every change in operating mode is recorded by time, date, and mode.	16 records before overwrite
Backup	Every time the UPS switches to and from backup, the time and date are recorded.	16 records before overwrite
Fault	Every time a fault occurs, the date, time and fault is recorded.	16 records before overwrite

9.21 HELP Tab

This on-line help provides ready definitions of the Acronyms displayed on the touchscreen and their definitions. Each acronym and accompanying definition is displayed on a single page.

The navigation bar has an additional button in Record and Help called Auto-Page. Pressing Auto-Page

will cause the records to auto-page every 2 seconds. The button will alternately blink in black-on-white/white-on-black while in Auto-Page mode. Press the button again to exit Auto-Page mode.

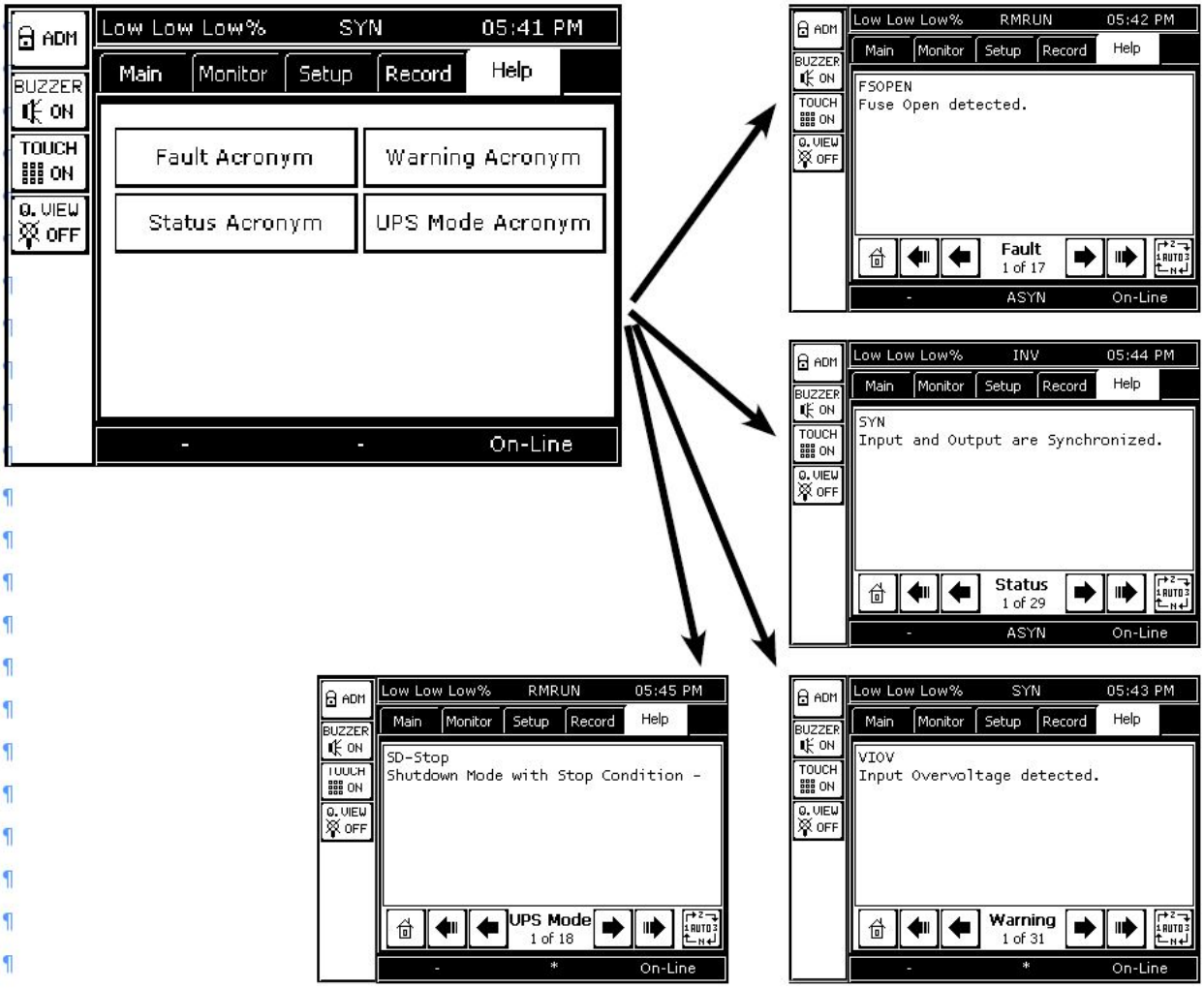


Figure 9-18 Help Index

9.22 System Fault Messages

A Fault message is generated when either a fault condition occurs, or a warning condition occurs three times within ten minutes. The table below shows the possible fault messages and what actions need be taken.

If the input voltage is normal when the fault occurs then the UPS will switch immediately to the bypass mode to continuously feed power to the load.

If the fault condition occurs while the input power is abnormal and the UPS is in Bypass mode the UPS will shut down the output to prevent load equipment damage.

When a Fault condition exists, the red LED on the UPS display panel will illuminate until the fault is cleared.

Table 9.13 System Fault Messages

Display	Meaning	Action
BYPOH	Bypass Overheat – Overheating condition occurred.	Check unit for blocked or in-operable fan. Lower ambient temperature if it is greater than 104 °F (40 °C). Bypass operation will also cease if overheat condition is not corrected within 1 hr. of inverter shutdown. Try restarting. If condition re-occurs plan for total shutdown and call for service.
CL	Current Limit – UPS not within specifications.	Contact the nearest Toshiba authorized representative for service.
COV	Charger Overvoltage – Charger overvoltage condition occurred.	Contact the nearest Toshiba authorized representative for service.
DCOC	DC Bus Overcurrent – DC overcurrent condition occurred.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call for service.
DCOV	DC Bus Overvoltage – DC overvoltage condition occurred.	UPS is possible faulty, input wiring error, input overvoltage or connection of a motor load. Try restarting. If condition persists call for service.
DCUB	DC bus unbalanced.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call for service.
DCUVBS	DC Bus Undervoltage during Boostup Mode – DC Bus undervoltage condition occurred.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call for service.
DCUVC	DC Bus Undervoltage During Charging Mode – DC Bus undervoltage condition occurred.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call for service.
DOH	Device Overheat – Overheating condition occurred.	Reduce equipment load to 100% or less and try restarting.
OOC	Output Overcurrent – UPS is overloaded.	Shutdown excess equipment to reduce load.
PHBRER	Bypass phase rotation error.	Bypass phase rotation is reversed. Switch any two input cable connections: A and B, B and C, or C and A.
PHIRER	Input phase rotation error.	Input phase rotation is reversed. Switch any two input cable connections: A and B, B and C, or C and A.
UPSOL	UPS Overload.	Reduce equipment load to 100% or less.
VOOV	Output Overvoltage – Output overvoltage condition occurred.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call for service.
VOUV	Output Undervoltage – Output undervoltage condition occurred.	UPS is possibly faulty. Check the UPS operation conditions at time of fault. Not advisable to restart the UPS. Call for service.

9.23 System Warning Messages

Warning messages are generated when a noncritical abnormal operating condition occurs. The following tables shows possible messages and their meaning.

When a Warning condition exists, the amber LED on the UPS display panel will flash for the duration of the Warning condition

Table 9.14 System Warning Messages

Display	Meaning	Action
ASYN	Asynchronous mode – Input and output frequency are different. Bypass is disabled.	No Action Needed.
BLFEND	Battery Lifetime End – Batteries at end of life.	Have batteries replaced immediately.
BLFNE	Battery Lifetime Near End – Batteries are nearing the end of their expected lifetime.	Contact the nearest Toshiba authorized representative to arrange for battery replacement.
BMCCBO	Battery MCCB is OFF - Backup power is not available.	Switch Battery Breaker ON.
BOH	Battery Overheat – Battery not within specifications.	Contact the nearest Toshiba authorized representative for service.
BTFAIL	Battery Test Failed – Battery not within specifications.	Contact the nearest Toshiba authorized representative for service.
BYP	UPS is in bypass mode.	Switch UPS On-Line.
CALL	Service Call Required – Inspection of the unit is advised.	Have inspection/service performed.
COV	Charger Overvoltage – Battery Charger not within specifications.	Contact the nearest Toshiba authorized representative for service.
CL	Current Limit – UPS not within specifications.	Contact the nearest Toshiba authorized representative for service.
EEUPDER	EEPROM Update error.	Contact the nearest Toshiba authorized representative for service.
EE2RAER	EEPROM to ROM loading error.	Contact the nearest Toshiba authorized representative for service.
FIBYER	Input/Bypass Frequency Error – Input frequency outside of UPS specifications.	Depends on UPS mode.
INVOL	Inverter overload.	Shutdown excess load equipment to reduce load.
MCCBTRP	UPS input MCCB tripped open.	
NOCOM	No communication between main controller and display.	Contact the nearest Toshiba authorized representative for service.
OL110	Overload – UPS is overloaded (110% and above) Unit will switch to bypass operation or shut down if no action is taken.	Shut down excess equipment to reduce load.
REYDNER	RemotEye III Downlink error (main and communication error).	Contact the nearest Toshiba authorized representative for service.
REYEUPER	RemotEye III Uplink error.	Contact the nearest Toshiba authorized representative for service.
RO2EEER	ROM to EE error.	Contact the nearest Toshiba authorized representative for service.
SOH	System overheat.	Contact the nearest Toshiba authorized representative for service.

Display	Meaning	Action
SRV232ER	RS-232 service port error.	Contact the nearest Toshiba authorized representative for service.
STFAIL	System test failed.	Contact the nearest Toshiba authorized representative for service.
VBNG	Battery voltage is not good.	Contact the nearest Toshiba authorized representative for service.
VBLO	Battery Voltage low.	Battery backup is xx% depleted.
VBSD	Battery voltage reached shutdown level.	Battery backup is exhausted. UPS will shut down until utility power is restored.
VBYOV	Bypass overvoltage.	Restore On-Line operation as soon as possible.
VBYUV	Bypass under voltage.	Restore On-Line operation as soon as possible.
VIOV	Input Overvoltage – Input voltage exceeds UPS specifications.	Depends on UPS mode.
VIUV	Input Undervoltage – Input voltage less than UPS specifications.	Depends on UPS mode.

9.24 System Mode Messages

A UPS Mode message is generated when the UPS changes operating mode. The following tables list the possible operating modes for the UPS.

Table 9.15 System Mode Messages

Display	Meaning
Backup	Backup – Power comes from other than input.
BattTest	Battery Test – Battery test in progress.
Bypass	Bypass – UPS is offline, power is being provided directly from UPS input.
On-Line	On-Line – Input converter and inverter are running (Double conversion mode).
Shutdown	Shutdown – No output, DC Bus is charged through Soft-start Resistor.
Startup	Startup – UPS is starting up.

9.25 System Status Messages

A UPS Status message is generated when the UPS changes its status (from inverter to bypass mode, for example). The table below shows the possible Status messages and their meaning.

Table 9.16 System Status Messages

Display	Meaning	Action
ARTEN	Auto Retransfer Enable	No action needed.
BYP	Bypass mode – Power is supplied by UPS input.	No action needed.
BYPEN	Bypass Enable	No action needed.
DEFCAL	Touchscreen is using default values instead of calibrated values.	No action needed.
DLYSTRTUP	Delay Start – UPS is counting down prior to startup.	No action needed.

Display	Meaning	Action
EE1ST	EEPROM is loaded with default values.	No action needed.
EPO	EPO circuit is active.	Reset EPO switch to start.
EQCHRG	Equalized Charging	No action needed.
FLT	A fault has occurred.	See Fault records.
FRCDBYP	UPS forced into bypass mode.	Secure the load and contact the nearest Toshiba authorized representative for service.
FWUPD	Firmware updated.	No action needed.
INVSTUP	UPS starts up in inverter mode (skips bypass)	No action needed.
INV	Inverter mode.	Inverter is running (it can be On-Line, Battery Test, or Backup)
LANSD	UPS goes to Shutdown triggered from LAN SD (shutdown) circuit.	Deactivate LAN shutdown signal to reset.
LB	Low Battery – The battery voltage has dropped low (about 90% or less) during operation. Continued operation in this mode will deplete battery and cause output shut down. (This can be adjusted by the operator	Immediately shut down the load equipment in an orderly fashion and then press the STOP key.
LCRUN	Local run command issued.	No action needed.
MANUAL	UPS is in Manual mode	No action needed.
OUT50HZ	UPS set for 50 Hz Output.	No action needed.
PFAIL	Input power failure.	No action needed.
PRCHRG	Protective charging	No action needed.
RMRUN	Remote Run command issued.	No action needed.
RMTSD	Remote shutdown occurred.	One or more warnings occurred. Check the Warnings field for details. Disconnect LAN signal to reset.
RMTSWEN	Remote switch control enable.	No action needed.
SYN	Synchronous mode.	Input and output are synchronized.
TIMEDSD	UPS is counting down prior to shutdown.	Immediately shut down the load equipment in an orderly fashion and then press the STOP key.
WRN	A warning has occurred.	See Warning record.

10 UPS Operation

The 4200FA UPS is hardwired to both utility power and the critical loads. The two main operating states are

- On-Line with the UPS providing clean power to the load.
- Bypass, where the power is routed around the converter-inverter of the UPS and fed directly to the load.
- A Third state, Emergency shut-down, is for emergency use only and is discussed separately.

The UPS can be switched between On-Line and Bypass by switching the key switch located below the touchscreen display.

10.1 Initial UPS Startup

The first time the UPS is started after installation, use the touchscreen to enter the current time and date.

1) Start the UPS as described in **Section 10.2,** steps 1-5.
2) Enter the **System Date**:
    i) Press the **Setup** tab.
    ii) Press **System Date** in the Data Display Area.
    iii) Enter the date in the following format: **Www Mmm DD YYYY**
        (a) **Www** is the three character day of the week: Mon, Tue, Wed...
        (b) **Mmm** is the three character Month: Jan, Feb, Mar...
        (c) **DD** is the two digit day of the month: 01, 12, 30...
        (d) **YYYY** is the four digit year: 2013
    iv) Press **Write** to store the date.
    v) Press **Quit** to exit **System Date** setup.
3) Enter the **System Time**:
    Press the **Setup** tab.
    i) Press **System Time** in the Data Display Area.
    ii) Enter the Time in the following format: **HH:MM AM**
        (a) **HH** is the two digit hour followed by a colin (:)
        (b) **MM** is the two digit month.
        (c) **AM/PM** is before or after noon.
    iii) Press **Write** to set the time.
    iv) Press Quit to exit System Time setup.

10.2 Starting the UPS

1. Switch the main circuit breaker (MCCB) on the inside front of the UPS to the **ON** position.
2. Switch on the optional second Circuit Breaker if the UPS is equipped with dual inputs. The breaker(s) should normally remain in the **ON** position.

3. Verify that the **On-Line** LED on the front panel lights green. All LED's on the front panel may light for a moment when the input breaker is turned on. This is normal. The UPS will now be supplying power in the bypass mode.

NOTICE

When running the UPS for the first time or after the power failure backup operation, charge the battery cabinet batteries, if any, for at least 24 hours (input breaker on) before operating the connected load.

Using the UPS without charging the battery shortens the battery backup operation time, which may result in the loss of data in case of a power failure.

4. Rotate the **Bypass/On-Line** switch to **On-Line** to begin UPS operation.
5. Press the **Quick View** button on the Quick Access Toolbar and verify the UPS has input/output power. If the UPS has backup batteries, verify the batteries are being charged.

10.3 Stopping the UPS

To stop the UPS, rotate the **Bypass/On-Line** switch to **Bypass**. The **On-Line** LED changes from green to off. The UPS is now in Bypass mode.

NOTICE

If the input breaker is turned off while UPS is in the bypass state, the output power stops. Any load devices will lose power.

Ensure that all sensitive loads have been previously shut down.

To completely stop the UPS, open/turn off the main input breaker MCCB, and the secondary Input breaker if available.

10.4 EPO (Emergency Power Off) Function

These units are equipped with terminals for receiving an EPO (Emergency Power Off) "closed contact" switch command from two locations:

(1) A remote location

(2) From the front panel mounted EPO switch.

This safety feature enables quick shutdown of the UPS AC output and battery circuits. Usually the EPO switch is installed in a central location that is easily accessible to personnel concerned with the operation of the UPS and the equipment connected to it.

The EPO function is initiated by pressing and briefly holding the red EPO switch in the depressed (shutdown) position. The effect of using the EPO switch is the same whether the UPS is in the **AC Input Mode**, **Battery Backup Mode**, or the **Bypass Mode**. (See 'EMERGENCY OFF' screen.)

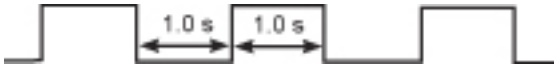
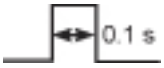
The following figure shows the UPS condition after application of the EPO switch.

Use the Start-up Procedure for restarting the unit.

10.5 Audible Alarm Functions

The UPS is equipped with an audible alarm that will beep when the UPS is in the battery backup mode, has a fault, has low battery voltage, or is in an overload condition. The audible alarm will also beep each time an effective item is touched on the touchscreen. The following chart shows the alarm pattern and durations for each condition. Time units are shown in seconds.

Table 10.1 AUDIBLE ALARMS

Condition	Audible Pattern
Any Fault (Intermittent buzz until fault clears)	
Switch to Backup (Single five-second buzz)	
Backup Operation (Intermittent buzz once every ten seconds)	
UPS Battery Shutdown Voltage (Batt. Voltage 79% Normal)	
Warnings: OL110 (Overload Timer) LB (Low Battery - Batt. Voltage 90% Normal) BLFN (Battery Life Pre-alarm - Batt expires in 6 mo.) BLFE (Battery Life End) CHRGOV (Charger Over Voltage) BTSTFL (Battery Test Fail) BOH (Battery Overheat) AOH (Ambient Overheat) CLMT (Current Limit) DCER (Display Disconnected) BDEPL (Battery Depletion)	
Touching Effective Item on Touchscreen	

The audible alarm can be silenced most easily by pressing the **Buzzer Silent** button on the Quick Access Toolbar.

Alternatively, the audible alarm can also be silenced by selecting the Settings tab, and then set the Buzzer Silent parameter to “Disable.”

This will turn off the audible alarm for the current alarm status, but the audible alarm will still sound when the next Fault/Warning condition occurs.

The audible alarm can be disabled permanently by selecting the Settings tab, then setting the parameter 808 - **Buzzer** to “Disable.” This will disable the alarm so that no alarm sounds for any Fault or Warning condition.

10.6 Initial Battery Charge

The UPS Battery System must be charged before it is used for the first time or when the unit has not been used (AC power source removed) for more than 10 days. The batteries can be charged in Online Mode, but the full backup capacity will require up to 24 hours of uninterrupted charging. Use the following procedure to recharge the UPS Battery System:

1) Ensure the UPS key switch is in the “BYPASS” position.
2) Switch on power at the UPS input distribution panel, and battery disconnects.
3) Switch the MAIN POWER SWITCH on the inner front panel to "ON." The UPS battery charging circuit is now activated. The AC ON LED will be green. The **MAIN** Tab will display on the Touchpad
4) With the key switch in the BYPASS position, the AC IN and the BYP LED’s will be lit.

   Press the touchscreen menu STATUS tab. The mimic display should show the power being routed through the MBS (Heavy Line)
5) Turn the Key Switch to “RUN”.

   If parameter 527 - **Battery Test** is set to “Enable”, the UPS automatically performs a controlled system battery test. (Note: The Automatic Battery Test.is performed only when the software is enabled for this function. The factory default is set to “Disable.”)

   (Allow 24-72 hours for the batteries to fully charge).

Use the following procedure if the automatic battery test fails and the “low battery” warning *VBLO* is displayed in the touchscreen footer (Figure 4-2):

1) Turn the key switch to “Bypass.”
2) Allow 24-72 hours for the batteries to charge and then switch the Circuit Breaker to "OFF."
3) Repeat Initial Battery Charge procedure. (A failure indicates battery replacement may be necessary).

10.7 Start-up Procedure

The UPS batteries must be charged before the UPS is used for the first time or if the unit has not been used (i.e. AC power source removed) for more than 10 days. Once the batteries are charged use the following start-up procedure:

1) Verify that all power switches are off, and that the "BYPASS/RUN” Switch on the UPS is in the “BYPASS” position.
2) Switch on the power at the customer-provided UPS input distribution panel.
3) Switch the UPS Circuit Breaker(s) to "ON." The AC Input LED will light. The touchscreen should display the MAIN tab:

With the key switch in the “BYPASS” position the LED’s will show (Ref. Table 9.1):

LED	Light
On-Line/Fault	(Off)
Warning	Flashing
A/C Input	Steady Green

The UPS battery charging circuit is now activated. Move the “BYPASS/RUN” key switch to the “RUN” position. The inverter will start and the UPS will transfer to the Normal Operating Mode.

LED	Light
On-Line/Fault	Steady Green
Warning	(Off)
A/C Input	Steady Green

If a fault occurs during start-up, the touchscreen footer Faults (Left side of the footer) will display the fault code, and the display LED’s will show:

LED	Light
On-Line/Fault	Steady Red
Warning	(Off)
A/C Input	Steady Green

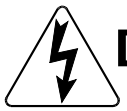
10.8 Shutdown Procedure

Use the following shutdown procedure when turning off the UPS.

1. Rotate the “BYPASS/RUN” key switch to “BYPASS."
2. Operation of the inverter halts. Output power is now provided to the load through the unit's Bypass circuit.

While in this state of operation; if a power failure occurs in the commercial power source, the UPS will lose power. Power to the critical load device will be interrupted.

The battery charging circuit and chopper circuit remains active.



DANGER ***Do not touch the UPS terminals even though the operation switch has been moved to the STOP position. The UPS may be supplying power through the Bypass circuit.***

3. The LED’s display as follows::

LED	Light
On-Line/Fault	(Off)
Warning	Flashing
A/C Input	Steady Green

4. Switch the Circuit Breaker to the "off" position. **Power is removed from the UPS and to any attached loads**. All LED’s are "off" and the touchscreen goes blank.
5. When the EPO (Emergency Power Off) switch, located on the front panel (or from a remote located EPO switch) is pushed, the Circuit Breaker is tripped and power is removed from the UPS and to any attached loads. All LED’s are "off" and the touchscreen goes blank.

10.9 Maintenance Bypass Procedure

NOTE: The 15-50kVA 4200 Base models do not come with an internal mechanical MBS. Transferring to Maintenance Bypass will result in loss of power to the critical load unless an external MPS is installed.

10.9.1 To safely set the unit in Maintenance Bypass:

1. First switch the UPS electrically to bypass by rotating the BYPASS/RUN switch to BYPASS.
2. Then mechanically engage the Maintenance Bypass Switch as follows:
    a. If an internal MBS, rotate the large red Bypass Switch clockwise to the Bypass position
    b. If an external MBS, follow the instructions on the MBS case or operators manual.

This prevents the UPS from being placed in parallel with commercial power.

Follow the instructions below when switching the UPS to and from Maintenance Bypass Mode.

WARNING Failure to adhere to the following instructions could result in damage to your equipment and/or you risk removal of power to any equipment attached to the UPS.

10.9.2 Switch from UPS to Maintenance Bypass

1) Turn the “BYPASS/RUN” key switch on the front panel to “BYPASS." Operation of the UPS inverter stops and the LED’s display shows:

LED	Light
On-Line/Fault	(Off)
Warning	Flashing
A/C Input	Steady Green

- the system mode message (left side of the touchscreen footer) indicates the unit is in BYPASS Mode
- the system status message (right side of the touchscreen footer) indicates the unit is in BYP Mode

2) Output power is now provided to the load through the Bypass circuit. ***While in this mode, if a power failure occurs on the commercial power source, the UPS will lose power. Power to the critical load device will be interrupted.*** The battery charging circuit and chopper circuit remains active.

3) Verify that step one above is followed, and that the BYP LED indicator on the front panel is illuminated.

   DO NOT physically place the UPS in Maintenance Bypass with the rotary Maintenance Bypass Switch until the touchscreen indicates the unit is in BYPASS Mode.

4) Locate the maintenance bypass rotary cam switch (middle of inner front panel of the UPS); slowly rotate the cam switch clockwise to the “BYPASS MODE” position.

(For the 25/50kVA 4200FA Base models, see Section 6.17 Note)

5) Turn off MCCB breaker labeled “MAIN POWER SWITCH."

The unit is now in the Maintenance Bypass mode and may be serviced. For units with internal transformers, except the Base models, the transformers are still energized.

10.9.3 Switch from Maintenance Bypass to UPS

1) Verify that the “BYPASS/RUN” switch is in the “**BYPASS”** position. Turn on MCCB “MAIN POWER SWITCH."
2) Wait until:
   - the system mode message (left side of the touchscreen footer) indicates the unit is in BYPASS Mode
   - the system status message (right side of the touchscreen footer) indicates the unit is in BYP Mode
   - the LED’s light as shown –

LED	Light
On-Line/Fault	(Off)
Warning	Flashing
A/C Input	Steady Green

3) For units with an external battery cabinet, turn on MCCB “BATTERY CABINET."
4) Locate the large red maintenance bypass switch (middle of inner front panel of the UPS (EXCEPT for Base models). Slowly rotate the cam switch counter-clockwise to the “UPS MODE” position.
5) Rotate the “BYPASS/RUN” switch to the “**RUN”** position.
6) Verify that:
   - The UPS mode changes from “STARTUP” to “ON-LINE” (left side of the touchscreen footer). indicates the unit is in BYPASS Mode

The unit is now back On-Line and supplying conditioned power to the load.

10.11 Equalize Charge Mode Select

Contact Toshiba Customer Support toll free at 1-877-867-8773 before using this option.

DAMAGE to the battery system may occur if this option is used improperly.

10.12 Overload Operation

When the UPS is operating and an overload condition is detected:

1. The touchscreen footer will display
    a. System Warning Message: OL110
    b. System Mode Message: ONLINE
2. After a period of time, if the overload is still not reduced and the BYPASS/RUN key switch is in the RUN position, the UPS will automatically transfer to Bypass and the footer display will change to
    a. System Fault Message: UPSOL
    b. System Warning Message: OL110
    c. System Mode Message: BYP
3. If the overload condition persists (See Specifications), the UPS will shut down:
    a. If in Online Mode, the Unit will transfer to Bypass Mode,
    b. If in Bypass Mode the unit will shut down and power to the load will be lost.

The load will have to be reduced before the unit can be restarted.

11 UPS Protection System

11.1 System Protection Features

The preceding one-line schematic illustrates the electrical locations of the protection devices on all UPS models.

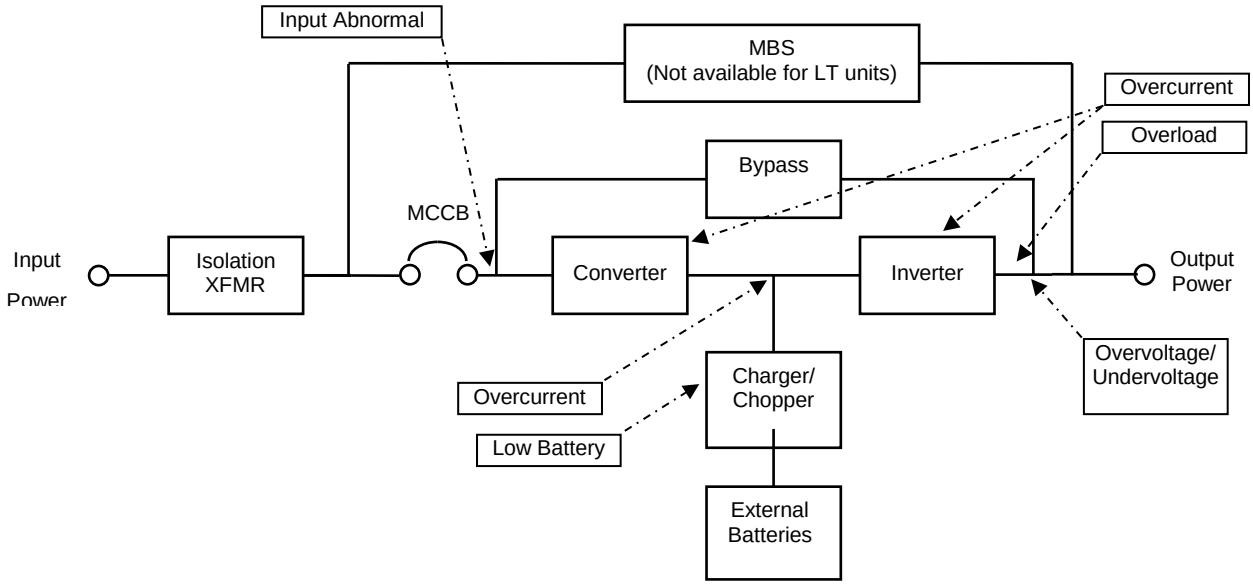


Figure 11-1 UPS Electrical Protection Sense Points

11.2 System Protection Functions

The following chart shows the built-in UPS fault protection functions on all models.

Table 11.1 Built-in UPS Fault Protection Functions

Protection Item	Inverter Over-voltage (IVOV)	Inverter Under-voltage (IVUV)	UPS Overload
Fault Message	INVERTER OVERVOLTAGE	INVERTER UNDERVOLTAGE	OUTPUT OVERLOAD
Cause	Control Malfunction; Feedback Error		Overload or short circuit at the load.
Operation Mode after Fault	Bypass Operation; Chopper and Inverter Stopped		Inverter Overload: Transfer to bypass; Inverter stopped. Bypass Overload: Inverter, Chopper, and Bypass stopped.
Audible Alarm	Yes: See Audible Alarm Functions		
Visible Alarm	Red Fault LED illuminated		Inverter OL: No Fault Lamp Bypass OL: Fault Lamp “on”
Relay Contact Alarm	Fault Relay closed; Bypass Relay closed		Inverter OL: Bypass Relay closed Bypass OL: Bypass Relay open and Fault relay closed
Auto-Retransfer	No		Inverter OL: Yes, if bypass ok Bypass OL: No
Protection Item	**Low Battery Voltage (Level-1)**	**Low Battery Voltage (Level-2)**	**Inverter Output Current Limit**
LCD Message	VBLO	VBSD	OUTPUT OVERLOAD
Cause	Battery is 80% Depleted	Battery Shutdown Level reached	Load Inrush current
Operation Mode after Fault	Battery Discharge	Shutdown: No Output	If Bypass ok, transfer to bypass; if not, current-limit mode

Audible Alarm	Yes: See Audible Alarm Functions		
Visible Alarm	NO	NO	NO
Relay Contact Alarm	Low Battery Relay closed	Bypass Relay closed	
Auto-Retransfer	No		Yes, if bypass ok

Table 11.2 Fault Alarms

Protection Item	Memory error (EE2RAER)	Internal overheat (DOH)	DC circuit overvoltage (DCOV)	DC circuit overcurrent (DCOC)
LCD Message	MAIN EEPROM to ROM Loading Error	Device Overheat	DC OVERVOLTAGE	DC OVERCURRENT
Cause	Display board chip error	Fan failure; high ambient	Chopper malfunction	Inverter / chopper fault
Operation Mode after Fault	Start is inhibited	Bypass operation; chopper and inverter are stopped		
Audible Alarm	Yes; continuous buzzer			
Visible Alarm	Red Fault LED illuminated			
Relay Contact Alarm	Fault relay closed; bypass relay closed			
Auto-Retransfer	NO			

12 Start-up / Scheduled Maintenance / Part Replacement

12.1 Start-up

The startup of the UPS equipment is broken up into several steps:

1. Initial Condition: This is where the service technician checks the unit for physical damage and verifies the installation of the UPS (electrically).
2. Static Checks: This step verifies the proper settings within the UPS logic.
3. Wiring Check: The wiring (power cables) between Utility, Load, and Other external components and the UPS.
4. Wiring Check: The wiring to (power cables) and from (control wires) the battery cabinet.
5. Main Voltage Check: The input voltages are checked to verify they are within the range.
6. Energizing the UPS: This step begins the internal self-checks within the processor logic.
7. Output Voltage Check: The output voltages are checked to verify they are within range.
8. EPO (Emergency Power Off): The EPO is operated to verify its operation in case of an emergency.
9. Load Testing: Performed if load is available.
10. Generator Testing: Performed if Generator is available.
11. Internal/External Maintenance Bypass: This verifies the proper operation of the Maintenance Bypass.

12.2 Preventive Maintenance

The 4200*FA* Uninterruptible Power Systems have been designed to provide years of trouble-free operation requiring a minimum of preventive maintenance.

The best preventive measure that the UPS user can take is to keep the area around the unit, particularly the air inlet vents, clean and free of moisture and dust accumulations. Schedule authorized TOSHIBA service centers to perform an internal parts inspection semi-annually.

CAUTION **Before performing any maintenance the technician should be familiar with and follow the important safety instructions within this manual.**

WARNING Proper maintenance of the battery system of this unit by factory authorized personnel is essential to the safety and reliability of your UPS system. Schedule authorized TOSHIBA service centers to perform internal parts inspections semi-annually.

12.3 Parts Replacement

The following list shows intervals for periodic maintenance and replacement of certain UPS parts.

1) **Batteries**: VRLA (Valve Regulated Lead Acid) batteries do not require the adding of water or electrolyte. The charging voltage, temperature, performance and connection resistance must be monitored periodically.

   Necessary corrective maintenance must be made in order to assure the UPS supplies safe reliable power. These items affect the life of batteries, so replacement should be once every 3 to 5 years as a minimum.

   All of the batteries must be replaced at the same time to eliminate the possibility of multiple failures due to resistances of the batteries.

2) **UPS - Recommended Quarterly Maintenance**

   A. Visual Checks

      1) Leakage

      2) Corrosion on positive terminal

   B. Check battery temperature at the negative terminal

   C. Measure and record the system float charging voltage.

   D. Measure and record the individual unit's float charging voltage.

3) **Recommended Semi-Annual maintenance**

   A. Repeat the quarterly checks.

   B. Perform impedance checks on the individual batteries.

   C. Optionally test for the purpose of trending the battery over time.

   D. Re-torque all inter-battery connecting hardware (if applicable).

4) **Aluminum electrolytic capacitors: Replace once every 5 years.**

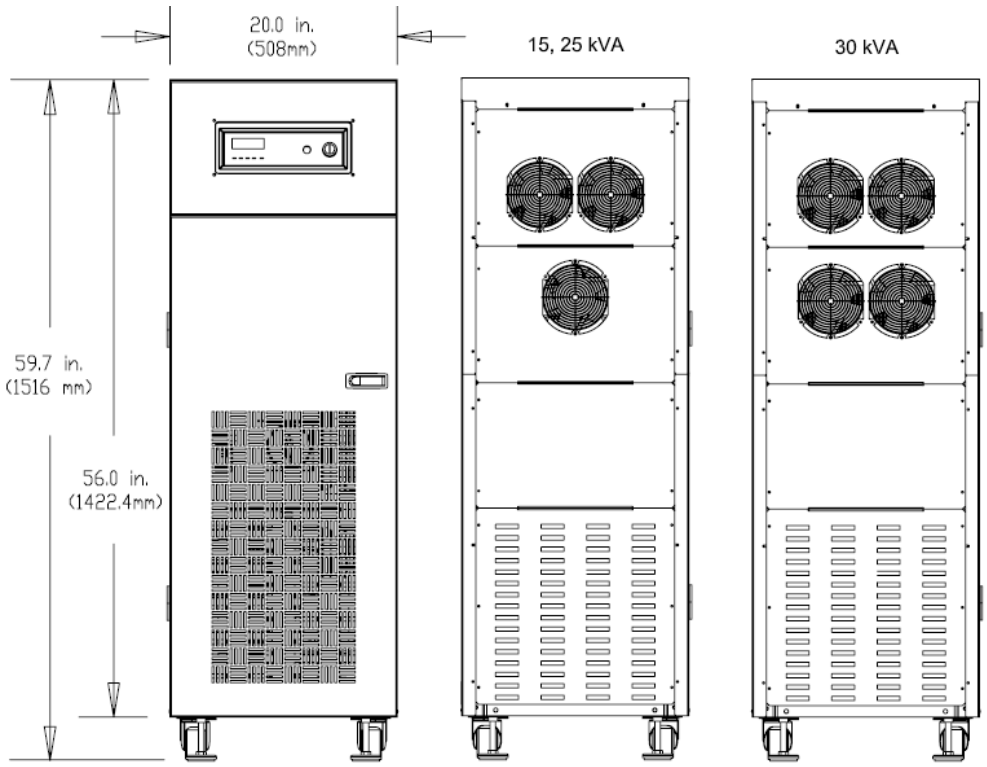
5) **Fuses: Replace once every 7 years**

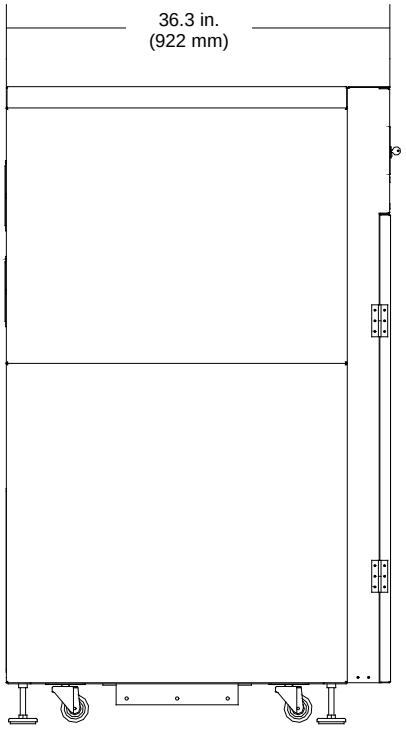
6) **Cooling fan: Replace once every 3 years**

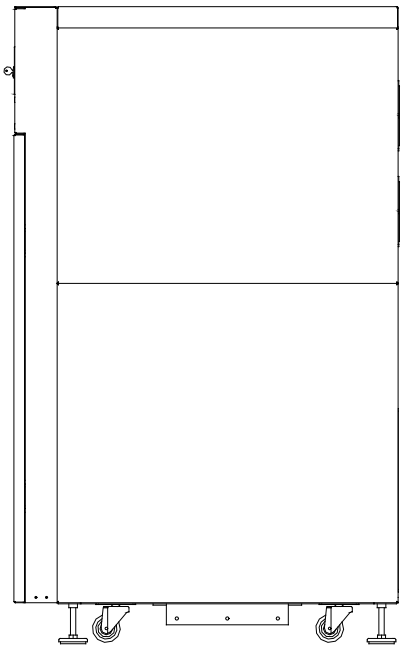
13 External Dimensions / Shipping Dimensions / Weights

13.1 External Dimensions

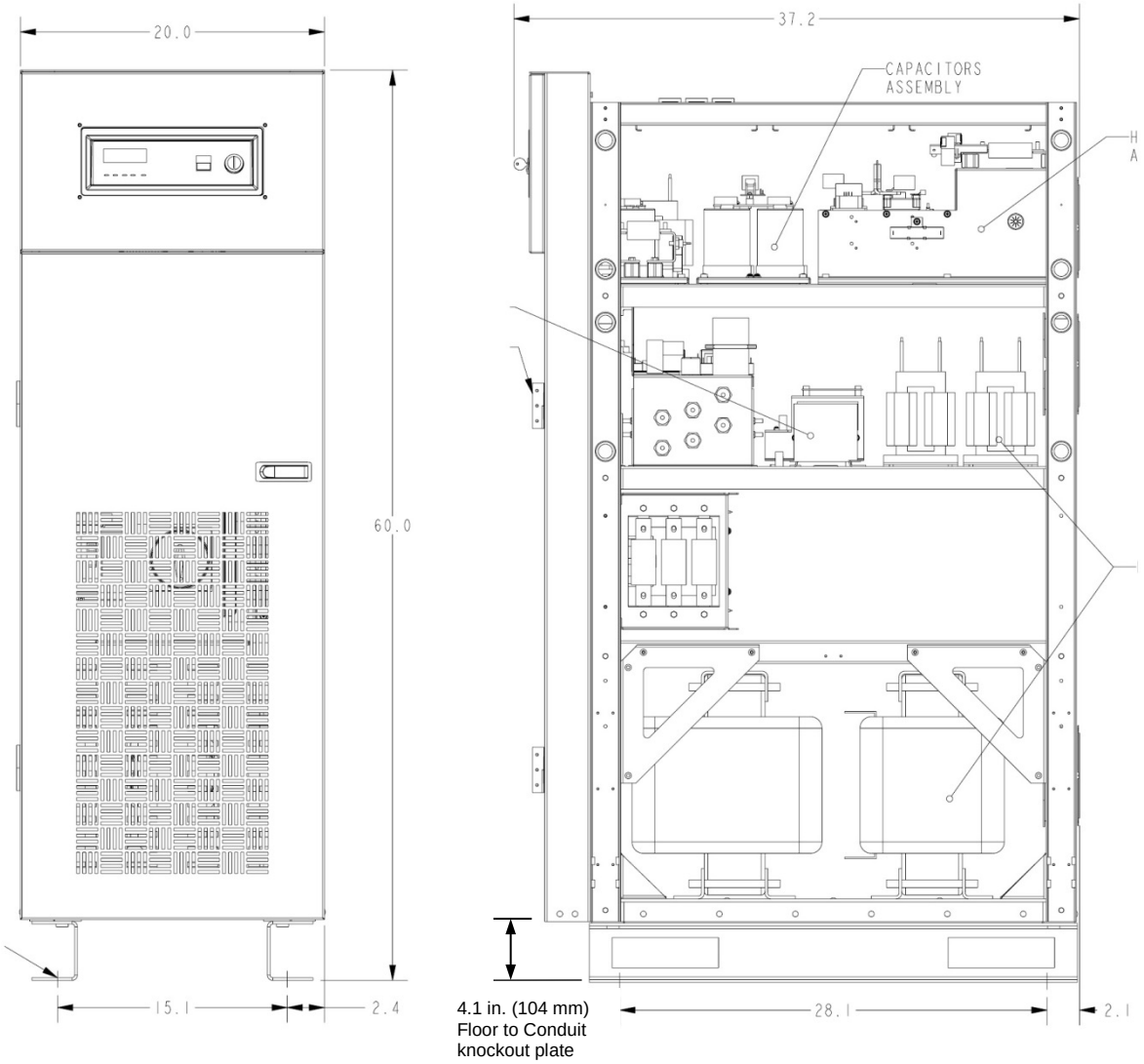
13.1.1 Dimensions – 15/25/30 kVA with Casters



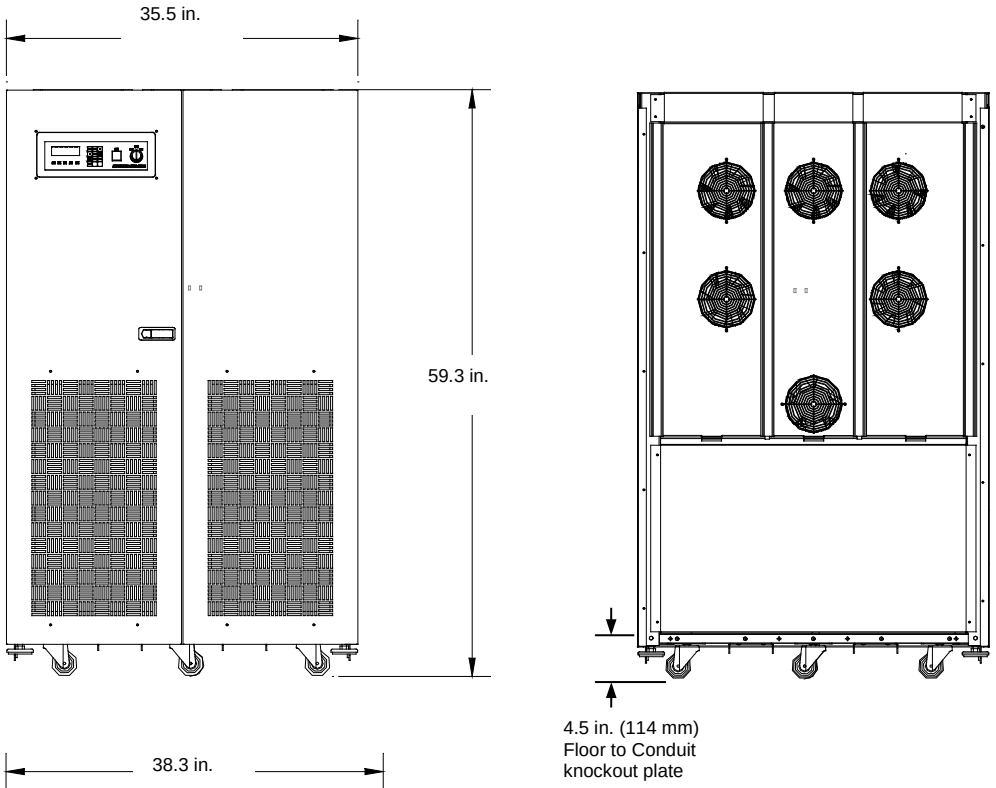

36.3 in.
(922 mm)



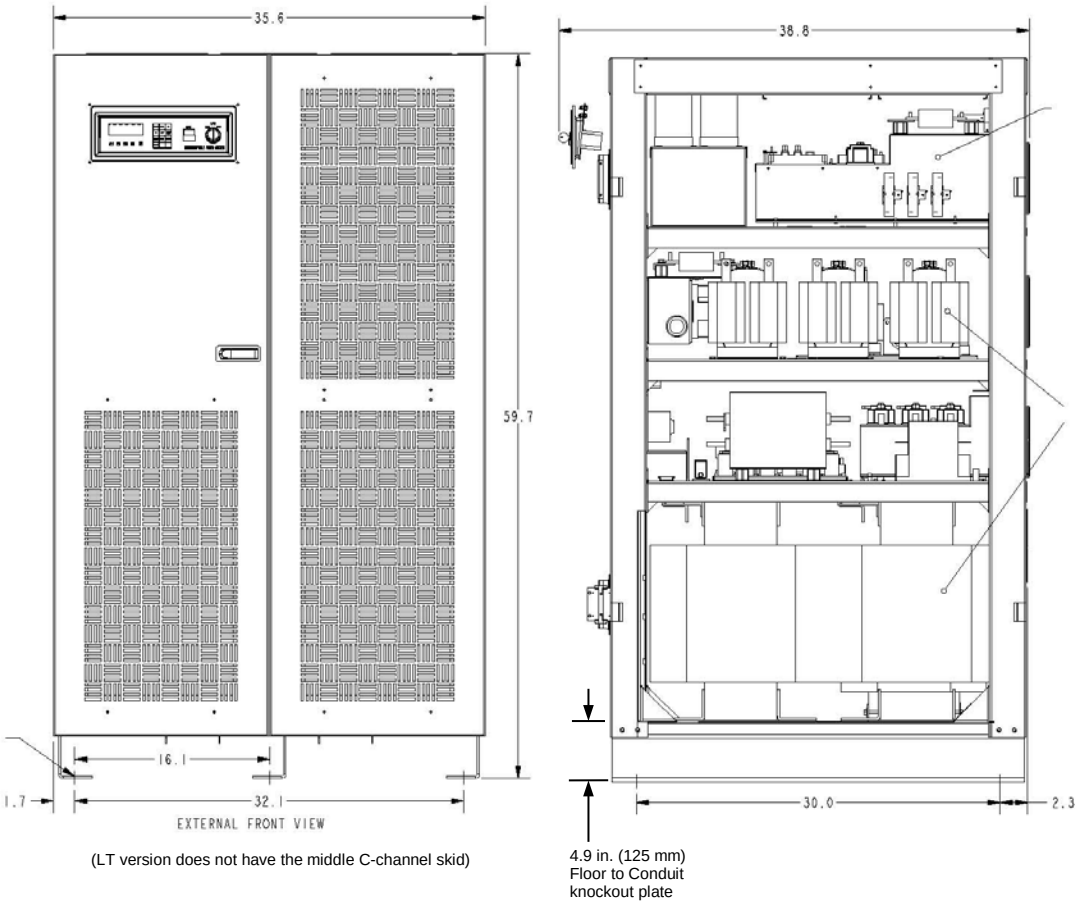
13.1.2 Dimensions – 15/25/30 kVA without Casters



13.1.3 Dimensions – 50kVA with casters



13.1.4 Dimensions – 50kVA without Casters



(LT version does not have the middle C-channel skid)

4.9 in. (125 mm)
Floor to Conduit
knockout plate

13.2 Shipping Dimensions and Weights

Table 13.1 15-30kVA Shipping Dimensions

All 15, 25 & 30 kVA models	Shipping Dimensions, (Pallet/Shrink Wrap)
Width	43.0 in. (1092 mm)
Depth	49.0 in. (1245 mm)
Height	72.0 in. (1829 mm)

Table 13.2 50kVA Shipping Dimensions

All 50 kVA models	Shipping Dimensions, (Pallet/Shrink Wrap)
Width	55.0 in. (1397 mm)
Depth	48.0 in. (1219 mm)
Height	72.0 in. (1829 mm)

Table 13.3 Weight of Premium and Seismic Units

UPS	Approximate Weight: Premium and –Seismic units			
	No Internal Batt. Or Xfmr	w/ Internal Batt.	w/ Internal Input Iso. Xfmr	w/ Internal Input Iso Xfmr, Internal Output Auto-Xfmr
15 kVA	794 lb (360 kg)	900 lb (408 kg)	783 lb (355 kg)	988 lb (448 kg)
25 kVA	804 lb (365 kg)	910 lb (413 kg)	793 lb (360 kg)	998 lb (453 kg)
30 kVA	809 lb (415 kg)	915 lb (415 kg)	798 lb (364 kg)	1003 lb (455 kg)
50 kVA	1221 lb (554 kg)	2548 lb (1156 kg)	1581 lb (717 kg)	1941 lb (880 kg)

Table 13.4 Weight of Base Units

UPS	Approximate Weight: Base units	
	No Internal Batt.	w/ Internal Batt.
15 kVA	618 lb (280 kg)	724 lb (328 kg)
25 kVA	628 lb (285 kg)	734 lb (333 kg)
30 kVA	633 lb (287 kg)	739 lb (335 kg)
50 kVA	1221 lb (554 kg)	2548 lb (1156 kg)

13.3 Cabinet Color

All UPS cabinets are colored “White-Gray” Trimite C09079PA80123 Beige, Eggshell Texture (or Sherwin Williams HHT2-70055079 Beige Texture.)

APPENDIX A – Seismic Anchorages

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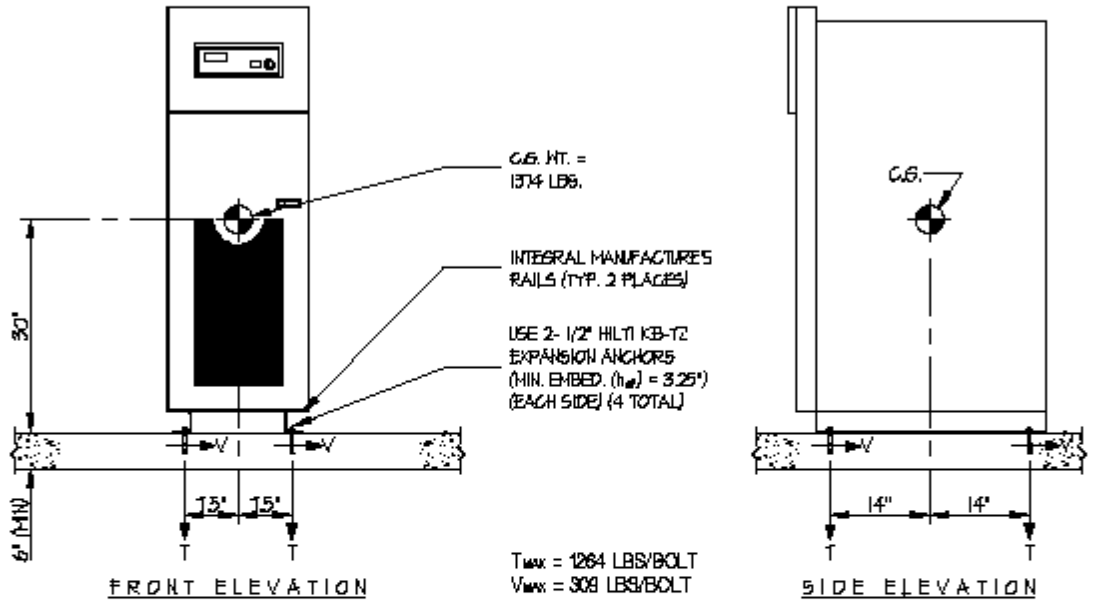
TOSHIBA INTERNATIONAL CORPORATION	DWN. J. ROBERSON	SHEET 1
	JOB NO. 10-1022	
15-30 kVA 4200 SERIES UPS CABINET	DATE 10/17/11	OF 1 SHEET

SEISMIC ANCHORAGE — SLAB ON GRADE



LOADS: PER 2010 CALIFORNIA BUILDING CODE SECTION 1613A AND ASCE 7-05 SECTIONS 12 AND 13.
(STRENGTH DESIGN IS USED) (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 6.0)

WEIGHT = 1374 LBS.
HORIZONTAL FORCE (E_h) = $0.90W_p$ = 1237 LBS.
VERTICAL FORCE (E_v) = $0.40W_p$ = 550 LBS.

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \left[\frac{1237\#(30")}{2\ BOLTS\ (28")} \times (0.9)\right] + \frac{1237\#(30")}{2\ BOLTS\ (15")} - \frac{0.9(1374\#) - 550\#}{4\ BOLTS} = 1264\ LBS/BOLT\ (MAX)$$

(MOMENT - FRONT TO BACK) (MOMENT - SIDE TO SIDE) (0.9(WEIGHT) - E_v)

SHEAR (V)

$$V_{MAXIMUM} = \frac{1237\#}{4\ BOLTS} = 309\ LBS/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{Tu}{\phi T}\right) + \left(\frac{Vu}{\phi V}\right) \leq 1.2$$

$$\left(\frac{1264}{2398}\right) + \left(\frac{309}{3462}\right) = 0.62 \leq 1.2 \therefore\ OK$$

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SLAB OR OTHER SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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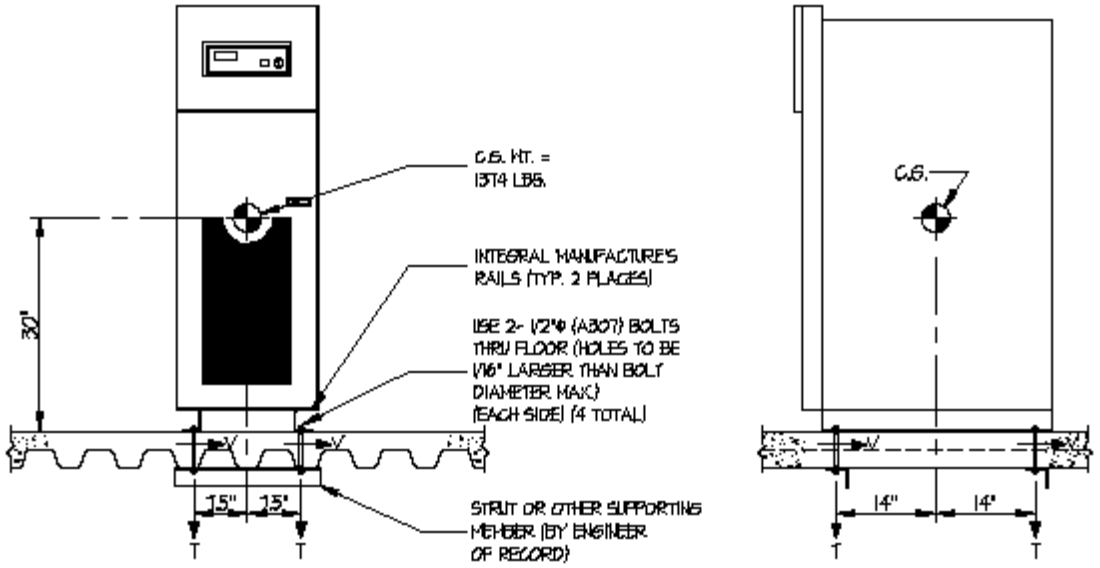
	JOB NO. 10-1022	
15-30 kVA 4200 SERIES UPS CABINET	DATE 10/17/11	OF 1 SHEET

SEISMIC ANCHORAGE — ELEVATED FLOOR



FRONT ELEVATION

T_{MAX} = 2220 LBS/BOLT
V_{MAX} = 515 LBS/BOLT

SIDE ELEVATION

LOADS: PER 2010 CALIFORNIA BUILDING CODE SECTION 1613A AND ASCE 7-05 SECTIONS 12 AND 13.
(STRENGTH DESIGN IS USED) (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 6.0)
WEIGHT = 1374 LBS.
HORIZONTAL FORCE (E_h) = 1.50W_p = 2061 LBS.
VERTICAL FORCE (E_v) = 0.40W_p = 1200 LBS.

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \left[\frac{2061\#(30")}{2\ \text{BOLTS}\ (28")} \times (0.9)\right] + \frac{2061\#(30")}{2\ \text{BOLTS}\ (15")} - \frac{0.9(1374\#) - 550\#}{4\ \text{BOLTS}} = 2220\ \text{LBS/BOLT (MAX)}$$

(HORZ. - FRONT TO BACK) (HORZ. - SIDE TO SIDE) (0.9(WEIGHT) - E_v)

SHEAR (V)

$$V_{MAXIMUM} = \frac{2061\#}{4\ \text{BOLTS}} = 515\ \text{LBS/BOLT (MAX)}$$ (PER ASC J3.7, LESS THAN 20% STRESS)

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SLAB OR OTHER SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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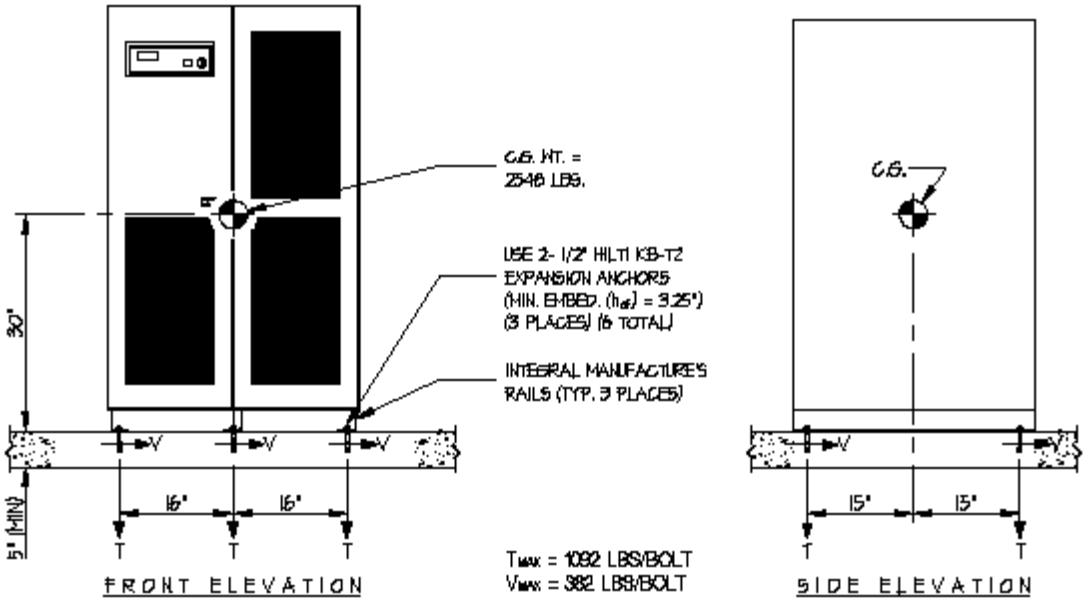
	JOB NO. 10-1022	
50 kVA 4200 SERIES UPS CABINET	DATE 10/17/11	OF 1 SHEET

SEISMIC ANCHORAGE — SLAB ON GRADE



LOADS: PER 2010 CALIFORNIA BUILDING CODE SECTION 1613A AND ASCE 7-05 SECTIONS 12 AND 13.
(STRENGTH DESIGN IS USED) (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 6.0)

WEIGHT = 2548 LBS.
HORIZONTAL FORCE (E_h) = $0.90W_p$ = 2293 LBS.
VERTICAL FORCE (E_v) = $0.40W_p$ = 1019 LBS.

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \left[\frac{2293\#(30")}{3\ BOLTS\ (30")} \times (0.9)\right] + \frac{2293\#(30")}{2\ BOLTS\ (32")} - \frac{0.9(2548\#) - 1019\#}{6\ BOLTS} = 1092\ LBS/BOLT\ (MAX)$$

(HORIZ. - FRONT TO BACK) (HORIZ. - SIDE TO SIDE) (0.9(WEIGHT) - E_v)

SHEAR (V)

$$V_{MAXIMUM} = \frac{2293\#}{6\ BOLTS} = 382\ LBS/BOLT\ (MAX)$$

UNITY CHECK:

$$\left(\frac{Tu}{\phi T}\right) + \left(\frac{Vu}{\phi V}\right) \leq 1.2$$

$$\left(\frac{1092}{2396}\right) + \left(\frac{382}{3462}\right) = 0.57 \leq 1.2 \therefore\ O.K.$$

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SLAB OR OTHER SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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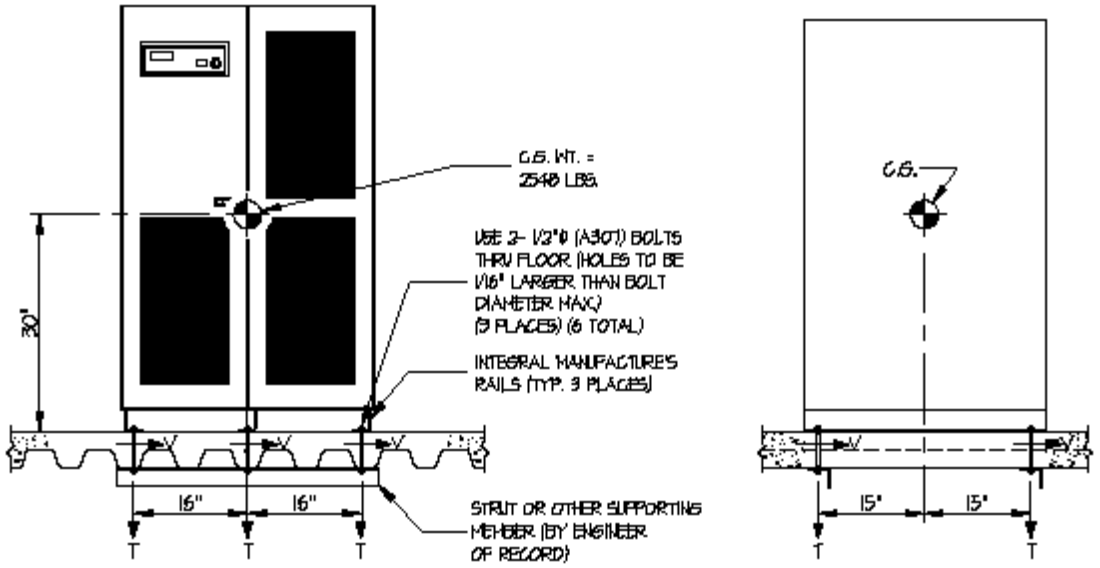
TOSHIBA INTERNATIONAL CORPORATION	DWN. J. ROBERSON	SHEET 1
	JOB NO. 10-1022	
50 kVA 4200 SERIES UPS CABINET	DATE 10/17/11	OF 1 SHEET

SEISMIC ANCHORAGE — ELEVATED FLOOR



FRONT ELEVATION — T_{MAX} = 1961 LBS/BOLT, V_{MAX} = 637 LBS/BOLT — SIDE ELEVATION

LOADS: PER 2010 CALIFORNIA BUILDING CODE SECTION 1613A AND ASCE 7-05 SECTIONS 12 AND 13.
(STRENGTH DESIGN IS USED) (S_{DS} = 2.00, a_p = 2.5, I_p = 1.5, R_p = 6.0)
WEIGHT = 2548 LBS.
HORIZONTAL FORCE (E_h) = $1.50W_p$ = 3822 LBS.
VERTICAL FORCE (E_v) = $0.40W_p$ = 1019 LBS.

BOLT FORCES:

TENSION (T)

$$T_{MAXIMUM} = \left[\frac{3822\#(30")}{3\ BOLTS\ (30")} \times (0.3)\right] + \frac{3822\#(30")}{2\ BOLTS\ (32")} - \frac{0.9(2548\#) - 1019\#}{6\ BOLTS} = 1961\ LBS/BOLT\ (MAX)$$

(HORZ. - FRONT TO BACK) (HORZ. - SIDE TO SIDE) (0.9(WEIGHT) - E_v)

SHEAR (V)

$$V_{MAXIMUM} = \frac{3822\#}{6\ BOLTS} = 637\ LBS/BOLT\ (MAX)\ (PER\ AISC\ J3.7,\ LESS\ THAN\ 20\%\ STRESS)$$

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SLAB OR OTHER SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

APPENDIX B – Installation Planning Guides

Important Notes:

1. Maximum Current required at Primary AC Input based on full load output and maximum battery charging current.
2. Output load conductors are to be installed in separate conduit from input conductors.
3. Control wires and power wires are to be installed in separate conduits.
4. Recommended AC input and output overcurrent protection based on continuous full load current per NEC.
5. Wiring shall comply with all applicable national and local electrical codes.
6. Grounding conductors to be sized per NEC Article 250-122. Neutral conductors to be sized per NEC Article 310.15.
   - Primary AC Input either 3ϕ, 4-wire + ground, or 3ϕ, 4-wire + ground.
   - AC Output either 3ϕ, 4-wire + ground, or 3ϕ, 4-wire + ground.
   - DC Input: 2-wire (Positive/Negative) + ground.
7. Power cable maximum size:
   - 15/25/30kVA: #1 AWG
   - 50kVA: 250 kcmil
   - 80kVA: 500 kcmil, Battery Terminals – 600 kcmil
8. Nominal battery voltage based on the use of VRLA type batteries is 2.0 volts/cell (VPC) nominal.
9. Maximum battery discharge current based on lowest permissible discharge voltage of 1.6 VPC.
10. DC wires should be sized to allow not more than a 2-volt drop at maximum discharge current.
11. Weights include internal batteries.
12. Sizing calculations based on the following assumptions:
    - Not more than 3 current-carrying conductors installed in steel conduit in ambient temperature of 86 °F (30 ° C.)
    - Temperature rating of conductors and terminals: 167 °F (75 °C.)
    - Feeder distance calculations based on NEC Tables 8 and 9 data, allowing for 2% AC voltage drop.
    - Reference: 2002 NEC Handbook. Consult latest edition of applicable national and local codes for possible variations.
13. Ratings of wires and overcurrent devices are suggested minimums. Consult with a registered Professional Engineer within your local area for proper size selections.

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TOSHIBA 4200*FA* UPS

Installation Planning Guide for 15-50kVA UPS

208/120V Input, 208/120V Output

For Maximum cable sizes, see Note 6 & 7.

General Mechanical Information			
UPS kVA/ kW Rating	Dimensions (W x D x H)	Weight w/o Battery (w/ Battery)	Approximate Full-Load Heat Loss
	Inches	Lbs.	kBtu/Hr
15 kVA/12 kW	20 x 36.3 x 60	618 (724)	5.8
25 kVA/ 20 kW	20 x 36.3 x 60	628 (734)	8.3
30 kVA/ 24 kW	20 x 36.3 x 60	633 (739)	11.7
50 kVA/ 40 kW	35.6 x 37.9x 59.7	1221 (2,548)	18.1

Primary AC Input (208/120V 3-Phase / 4-Wire)					
Maximum Input Power Demand			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	>0.97	42	60 A	(1) x 6 / (1) x 4	380
25	>0.97	67	90 A	(1) x 3 / (1) x 1	380
30	>0.97	81	110 A	(1) x 2 / (1) x 1	380
50	>0.97	138	175 A	(1) x 2/0 / (1) 250	380

External Battery Input (288VDC Nominal)					
Battery Capacity Required for Full Load Output		Maximum Discharge at Full Load Output	Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
	kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	14	61	70 A	(1) x 4	70
25	23	100	100 A	(1) x 1	70
30	28	120	125 A	(1) x 1	70
50	45	195	200 A	(1) x 250	70

AC Output (208/120V 3-Phase / 4-Wire)					
Rated Output Power			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	0.8	42	60 A	(1) x 6 / (1) x 4	380
25	0.8	69	90 A	(1) x 3 / (1) x 1	380
30	0.8	83	110 A	(1) x 2 / (1) x 1	380
50	0.8	139	175 A	(1) x 2/0 / (1) 250	380

Installation Planning Guide for 15-50kVA UPS

Standard System: 208v (Isolation Xfmr.) Input, 208/120V Output

For Maximum cable sizes, see Note 7.

General Mechanical Information			
UPS kVA/ kW Rating	Dimensions (W x D x H) Inches	Weight Lbs.	Approximate Full-Load Heat Loss kBTU's / Hr
15 kVA/12 kW	20 x 36.3 x 59.7	783	6.4
25 kVA/ 20 kW	20 x 36.3 x 59.7	793	9.1
30 kVA/ 24 kW	20 x 36.3 x 59.7	798	12.8
50 kVA/ 40 kW	35.5 x 38.3 x 59.3	1,581	21.3

Primary AC Input (208V 3-Phase / 3-Wire)					
Maximum Input Power Demand			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	>0.97	47	60 A	(1) x 6	380
25	>0.97	72	90 A	(1) x 3	380
30	>0.97	87	110 A	(1) x 1	380
50	>0.97	140	175 A	(1) x 2/0	380

Optional Alternate AC Input (208/120V 3-Phase / 4-Wire)				
Maximum Input Power Demand		Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	42	60 A	(1) x 6 / (1) x 4	380
25	67	90 A	(1) x 3 / (1) x 1	380
30	81	110 A	(1) x 1/ (1) x 1	380
50	138	175 A	(1) x 3/0 / (1) x 250	380

Battery Input (288VDC Nominal)					
Battery Capacity Required for Full Load Output		Maximum Discharge at Full Load Output	Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	15	64	70 A	(1) x 4	70
25	24	105	110 A	(1) x 1	70
30	29	126	150 A	(1) x 1	70
50	47	204	225 A	(1) x 250	70

AC Output (208/120V 3-Phase / 4-Wire)					
Rated Output Power			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	0.8	42	60 A	(1) x 6 / (1) x 4	380
25	0.8	69	90 A	(1) x 3 / (1) x 1	380
30	0.8	83	110 A	(1) x 2 (1) x 3/0	380
50	0.8	139	175 A	(1) x 2/0 / (1) x 250	380

Installation Planning Guide for 15-50kVA UPS

Standard System: 380V Input, 380/220V Output

For Maximum cable sizes, see Note 7.

General Mechanical Information			
UPS kVA/ kW Rating	Dimensions (W x D x H) Inches	Weight Lbs.	Approximate Full-Load Heat Loss kBTU's / Hr
15 kVA/12 kW	20 x 36.3 x 59.7	988	7.2
25 kVA/ 20 kW	20 x 36.3 x 59.7	998	10.5
30 kVA/ 24 kW	20 x 36.3 x 59.7	1003	14.3
50 kVA/ 40 kW	35.5 x 38.3 x 59.3	1941	22.6

Primary AC Input (380V 3-Phase / 3-Wire)					
Maximum Input Power Demand			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	>0.97	26	35 A	(1) x 8	480
25	>0.97	40	60 A	(1) x 6	480
30	>0.97	48	70 A	(1) x 6	480
50	>0.97	77	100 A	(1) x 3	480

Battery Input (288VDC Nominal)					
Battery Capacity Required for Full Load Output		Maximum Discharge at Full Load Output	Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
	kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	15	64	70 A	(1) x 4	70
25	24	105	110 A	(1) x 1	70
30	29	126	150 A	(1) x 1	70
50	47	204	225 A	(1) x 250	70

AC Output (380/220V 3-Phase / 4-Wire)					
Rated Output Power			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	0.8	23	30 A	(1) x 8 / (1) x 8	380
25	0.8	38	50 A	(1) x 8 / (1) x 4	380
30	0.8	46	60 A	(1) x 6 / (1) x 3	380
50	0.8	76	100 A	(1) x 3 / (1) x 2/0	380

Installation Planning Guide for 15-50kVA UPS

Standard System: 480V Input, 208/120V Output

For Maximum cable sizes, see Note 7.

General Mechanical Information

UPS kVA/ kW Rating	Dimensions (W x D x H) Inches	Weight Lbs.	Approximate Full-Load Heat Loss kBTU's / Hr
15 kVA/12 kW	20 x 36.3 x 59.7	988	7.2
25 kVA/ 20 kW	20 x 36.3 x 59.7	998	10.5
30 kVA/ 24 kW	20 x 36.3 x 59.7	1,003	14.3
50 kVA/ 40 kW	35.5 x 38.3 x 59.3	2,200	22.6

Primary AC Input (480V 3-Phase / 3-Wire)

Maximum Input Power Demand			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	>0.97	21	30 A	(1) x 10 / (1) x 12	480
25	>0.97	32	50 A	(1) x 8 / (1) x 6	480
30	>0.97	38	60 A	(1) x 6 / (1) x 4	480
50	>0.97	61	80 A	(1) x 4 / (1) x 2	480

Optional Alternate AC Input (208V 3-Phase / 4-Wire)

Maximum Input Power Demand		Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	42	60 A	(1) x 6 / (1) x 4	380
25	69	90 A	(1) x 3 / (1) x 1	380
30	83	110 A	(1) x 2 / (1) x 1	380
50	139	175 A	(1) x 2/0 / (1) x 250	380

Battery Input (288VDC Nominal)

Battery Capacity Required for Full Load Output		Maximum Discharge at Full Load Output	Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
	kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	15	64	70 A	(1) x 6 / (1) x 4	70
25	24	105	110 A	(1) x 2 / (1) x 1	70
30	29	126	150 A	(1) x 1	70
50	47	204	225 A	(1) x 4/0 / (1) x 250	70

AC Output (208/120V 3-Phase / 4-Wire)

Rated Output Power			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	0.8	42	60 A	(1) x 6 / (1) x 4	380
25	0.8	69	90 A	(1) x 3 / (1) x 1	380
30	0.8	83	110 A	(1) x 2 / (1) x 1	380
50	0.8	139	175 A	(1) x 2/0 / (1) x 250	380

Installation Planning Guide for 15-50kVA UPS

Standard System: Dual 480V Input, 208/120V Output (T42D3FnnnDAMxNxx)

For Maximum cable sizes, see Note 7.

General Mechanical Information			
UPS kVA/ kW Rating	Dimensions (W x D x H) Inches	Weight Lbs.	Approximate Full-Load Heat Loss kBTU's / Hr
15 kVA/12 kW	20 x 36.3 x 59.7	988	7.2
25 kVA/ 20 kW	20 x 36.3 x 59.7	998	10.5
30 kVA/ 24 kW	20 x 36.3 x 59.7	1,003	14.3
50 kVA/ 40 kW	35.5 x 38.3 x 59.3	2,200	22.6

Primary AC Input (480V 3-Phase / 3-Wire)					
Maximum Input Power Demand			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	>0.97	21	30 A	(1) x 10 / (1) x 12	480
25	>0.97	32	50 A	(1) x 8 / (1) x 6	480
30	>0.97	38	60 A	(1) x 6 / (1) x 4	480
50	>0.97	61	80 A	(1) x 4 / (1) x 2	480

Optional Alternate AC Input (480V 3-Phase / 3-Wire)				
Maximum Input Power Demand		Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	21	30 A	(1) x 10 / (1) x 12	480
25	32	50 A	(1) x 8 / (1) x 6	480
30	38	60 A	(1) x 6 / (1) x 4	480
50	61	80 A	(1) x 4 / (1) x 2	480

Battery Input (288VDC Nominal)					
Battery Capacity Required for Full Load Output		Maximum Discharge at Full Load Output	Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
	kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	15	64	70 A	(1) x 6 / (1) x 4	70
25	24	105	110 A	(1) x 2 / (1) x 1	70
30	29	126	150 A	(1) x 1	70
50	47	204	225 A	(1) x 4/0 / (1) x 250	70

AC Output (208/120V 3-Phase / 4-Wire)					
Rated Output Power			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	0.8	42	60 A	(1) x 6 / (1) x 4	380
25	0.8	69	90 A	(1) x 3 / (1) x 1	380
30	0.8	83	110 A	(1) x 2 / (1) x 1	380
50	0.8	139	175 A	(1) x 2/0 / (1) x 250	380

Installation Planning Guide for 15-50kVA UPS

Standard System: 480V Input, 480/277V Output

For Maximum cable sizes, see Note 7.

General Mechanical Information			
UPS kVA/ kW Rating	Dimensions (W x D x H) Inches	Weight Lbs.	Approximate Full-Load Heat Loss kBTU's / Hr
15 kVA/12 kW	20 x 36.3 x 59.7	988	7.2
25 kVA/ 20 kW	20 x 36.3 x 59.7	998	10.5
30 kVA/ 24 kW	20 x 36.3 x 59.7	1003	14.3
50 kVA/ 40 kW	35.5 x 38.3 x 59.3	1941	22.6

Primary AC Input (480V 3-Phase / 3-Wire)					
Maximum Input Power Demand			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	>0.97	21	30A	(1) x 10	480
25	>0.97	32	45 A	(1) x 8	480
30	>0.97	38	60 A	(1) x 8	480
50	>0.97	61	80 A	(1) x 4	480

Battery Input (288VDC Nominal)					
Battery Capacity Required for Full Load Output		Maximum Discharge at Full Load Output	Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
	kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	15	64	70 A	(1) x 4	70
25	24	105	110 A	(1) x 1	70
30	29	126	150 A	(1) x 1	70
50	47	204	225 A	(1) x 250	70

AC Output (480/277V 3-Phase / 4-Wire)					
Rated Output Power			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	0.8	18	25 A	(1) x 10 / (1) x 8	380
25	0.8	30	40 A	(1) x 8 / (1) x 6	380
30	0.8	36	45 A	(1) x 8 / (1) x 4	380
50	0.8	60	75 A	(1) x 4 / (1) x 2	380

Installation Planning Guide for 15-80kVA UPS

Standard System: 600V Input, 208/120V Output

For Maximum cable sizes, see Note 7.

General Mechanical Information

UPS kVA/ kW Rating	Dimensions (W x D x H) Inches	Weight Lbs.	Approximate Full-Load Heat Loss kBTU's / Hr
15 kVA/12 kW	20 x 36.3 x 59.7	783	6.4
25 kVA/ 20 kW	20 x 36.3 x 59.7	793	9.1
30 kVA/ 24 kW	20 x 36.3 x 59.7	798	12.8
50 kVA/ 40 kW	35.5 x 38.3 x 59.3	1581	21.3

Primary AC Input (600V 3-Phase / 3-Wire)

Maximum Input Power Demand			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	>0.98	16	25 A	(1) x 10	480
25	>0.98	25	35 A	(1) x 10	480
30	>0.98	30	45 A	(1) x 6	480
50	>0.98	49	70 A	(1) x 6	480

Optional Alternate AC Input (208/120V 3-Phase / 4-Wire)

Maximum Input Power Demand		Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	42	60 A	(1) x 6 / (1) x 4	480
25	69	90 A	(1) x 3 / (1) x 1	480
30	83	110 A	(1) x 2 / (1) x 1	480
50	139	175 A	(1) x 2/0 / (1) x 250	480

Battery Input (288VDC Nominal)

Battery Capacity Required for Full Load Output		Maximum Discharge at Full Load Output	Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
	kWB	Amps DC	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	15	64	70 A	(1) x 4	70
25	24	105	110 A	(1) x 1	70
30	29	126	150 A	(1) x 1	70
50	47	204	225 A	(1) x 250	70

AC Output (208/120V 3-Phase / 4-Wire)

Rated Output Power			Suggested External Feeder Breaker	Suggested Minimum Feeder Wire Size Per Phase / Neutral	Suggested Maximum Feeder Length For Min. Wire Size in Steel Conduit
kVA	PF	Amps	Amps	AWG or kcmil at 75º C Temp. Rating	Feet
15	0.8	42	60 A	(1) x 6 / (1) x 4	380
25	0.8	69	90 A	(1) x 3 / (1) x 1	380
30	0.8	83	110 A	(1) x 2 / (1) x 1	380
50	0.8	139	175 A	(1) x 2/0 / (1) x 250	380

APPENDIX C – 4200 FA Parameter Definitions

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
0	1	UPS Manufacturer	Manufacturer		R	R		Y
0	2	UPS Typeform	Typeform		R	R	See Toshiba UPS Typeform document.	Y
0	3	UPS Serial Number	Serial No.		R	R	**YYYYMMNNNNN** Where **YYYY** is four digits year **MM** is two digits month **NNNNN** is five digit number	Y
0	8	UPS System Name	System Name		R	R/W	Such as Plant3, Upstairs...	Y
0	9	UPS Attached Devices	Attached Device		R	R/W		Y
0	10	UPS Installation Date	Installed Date		R	R/W	**YYYYMMDD**	Y
1	1	Input Line to Line Voltage (AB)	Voltage (AB)	V	R	R		Y
1	2	Input Line to Line Voltage (BC)	Voltage (BC)	V	R	R		Y
1	3	Input Line to Line Voltage (CA)	Voltage (CA)	V	R	R		Y
1	4	Input Line to Neutral Voltage (AN)	Voltage (AN)	V	R	R		Y
1	5	Input Line to Neutral Voltage (BN)	Voltage (BN)	V	R	R		Y
1	6	Input Line to Neutral Voltage (CN)	Voltage (CN)	V	R	R		Y
1	7	Input Phase Current (A)	Current (A)	A	R	R		Y
1	10	Input Frequency (A)	Freq (A)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
1	11	Input Frequency (B)	Freq (B)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
1	12	Input Frequency (C)	Freq (C)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
1	21	Input Voltage in % (A)	Voltage (A)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
1	22	Input Voltage in % (B)	Voltage (B)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
1	23	Input Voltage in % (C)	Voltage (C)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
1	40	No of Input Lines	No of Input Line		R	R		Y
1	41	Rated Line to Line Input Voltage	Rated Voltage L-L	V	R	R		Y
1	42	Rated Line to Neutral Input Voltage	Rated Voltage L-N	V	R	R		Y
1	43	Rated Input Current	Rated Current	A	R	R		Y
1	45	Rated Input Power (W)	Rated Power (W)	W	R	R		Y
1	46	Rated Input Power (VA)	Rated Power (VA)	VA	R	R		Y
1	47	VIUV Detection Level	VIUV DeLevel	%	R	R		Y
1	49	VIOV Detection Level	VIOV DeLevel	%	R	R		Y
1	58	Enable Phase Check	En Phase Check		R	R		Y
2	1	Output Line to Line Voltage (AB)	Voltage (AB)	V	R	R		Y
2	2	Output Line to Line Voltage (BC)	Voltage (BC)	V	R	R		Y
2	3	Output Line to Line Voltage (CA)	Voltage (CA)	V	R	R		Y
2	4	Output Line to Neutral Voltage (AN)	Voltage (AN)	V	R	R		Y
2	5	Output Line to Neutral Voltage (BN)	Voltage (BN)	V	R	R		Y
2	6	Output Line to Neutral Voltage (CN)	Voltage (CN)	V	R	R		Y
2	7	Output Phase Current (A)	Current (A)	A	R	R		Y
2	8	Output Phase Current (B)	Current (B)	A	R	R		Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
2	9	Output Phase Current (C)	Current (C)	A	R	R		Y
2	10	Output Frequency (A)	Freq (A)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
2	11	Output Frequency (B)	Freq (B)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
2	12	Output Frequency (C)	Freq (C)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
2	13	Output Power W (Total)	Power W (Total)	kW	R	R		Y
2	21	Output Voltage % (A)	Voltage % (A)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
2	22	Output Voltage % (B)	Voltage % (B)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
2	23	Output Voltage % (C)	Voltage % (C)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
2	24	Output Current % (Total)	Current % (Total)	%	R	R		Y
2	25	Output Current % (A)	Current % (A)	%	R	R		Y
2	26	Output Current % (B)	Current % (B)	%	R	R		Y
2	27	Output Current % (C)	Current % (C)	%	R	R		Y
2	28	Output Power W % (Total)	Power W % (Total)	%	R	R		Y
2	36	Output Power Factor	Power Factor		R	R		Y
2	40	No of Output Line	No of Output Line		R	R		Y
2	41	Rated Line to Line Output Voltage	Rated Voltage L-L	V	R	R		Y
2	42	Rated Line to Neutral Output Voltage	Rated Voltage L-N	V	R	R		Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
2	43	Rated Output Current	Rated Current	A	R	R		Y
2	45	Rated Output Power (W)	Rated Power (W)	W	R	R		Y
2	46	Rated Output Power (VA)	Rated Power (VA)	VA	R	R		Y
2	47	VOUV Detection Level	VOUV DeLevel	%	R	R		Y
2	49	VOOV Detection Level	VOOV DeLevel	%	R	R		Y
3	1	Bypass Line to Line Voltage (AB)	Voltage (AB)	V	R	R		Y
3	2	Bypass Line to Line Voltage (BC)	Voltage (BC)	V	R	R		Y
3	3	Bypass Line to Line Voltage (CA)	Voltage (CA)	V	R	R		Y
3	4	Bypass Line to Neutral Voltage (AN)	Voltage (AN)	V	R	R		Y
3	5	Bypass Line to Neutral Voltage (BN)	Voltage (BN)	V	R	R		Y
3	6	Bypass Line to Neutral Voltage (CN)	Voltage (CN)	V	R	R		Y
3	10	Bypass Frequency (A)	Freq (A)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
3	11	Bypass Frequency (B)	Freq (B)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
3	12	Bypass Frequency (C)	Freq (C)	dHz	R	R	600 for 60.0 Hz, 500 for 50.0 Hz. UPS will send you one decimal point and format it according to decimal points	Y
3	21	Bypass Voltage % (A)	Voltage % (A)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
3	22	Bypass Voltage % (B)	Voltage % (B)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y
3	23	Bypass Voltage % (C)	Voltage % (C)	%	R	R	Percentage of Line to Line and Line to Neutral Voltage are the same	Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
3	40	No of Bypass Line	No of Bypass Line		R	R		Y
3	47	Bypass UV Detection Level	VbUV DeLevel	%	R	R		Y
3	49	Bypass OV Detection Level	VbOV DeLevel	%	R	R		Y
4	1	DC Bus Total	DC Bus Total	Vdc	R	R		Y
5	1	Battery Voltage	Battery Voltage	Vdc	R	R		Y
5	3	Battery Discharge Current	Discharge Current	Adc	R	R		Y
5	12	Equalized Setting	Auto Equal Ch		R	R/W		N
5	13	Equalized Charge Time	Equal Charge Time		R	R/W		Y
5	14	Float Charging Voltage	Vchrg Float	Vdc	R	R/W		Y
5	22	Low Battery Detection Level	Low Batt Level	Vdc	R	R		Y
5	24	Battery Shutdown Level	Batt SDown Level	Vdc	R	R		Y
5	26	Manual Battery Test	Manual Batt Test		R/W	R/W	**Enable** - Start Battery Test **Disable** - No Action If battery test: **Pass Test** - No Message, backup record will record successful batt test. **Fail Tes**t - Displays VBLO or VBSD message with warning LED and Buzzer.	N
5	27	Auto Battery Test	Auto Batt Test		R	R/W		Y
5	28	Battery Auto Test Interval	Auto Test Interval	Sec	R	R/W		Y
5	29	Battery Test at Startup	Batt Test @startup		R	R/W		Y
5	30	Equalized Power Failure Duration	PFail Dur. Equal	Sec	-	R/W		Y
5	31	Number of Batteries in Series	No Batt(Series)		R	R/W		Y
5	32	Number of Batteries in Parallel	No Batt(Paral)		R	R/W		Y
5	33	Rated Ampere Hour	Rated AHr		R	R/W		Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
5	34	Battery Pack's C Rate	C Rate		-	R/W		N
5	35	Battery Installed Date	Batt Ins. Date		R	R/W		Y
6	4	UPS Date	UPS Date		R	R/W		Y
6	5	UPS Time	UPS Time		R	R/W		Y
6	8	Current State	Current State		R	R	**0** - Shutdown **1** - Shutdown **2** - Shutdown **3** - Shutdown **4** - Shutdown **5** - Shutdown **6** - Bypass **7** - Bypass **8** – Bypass **9** - On-Line **10**- On-Line **11** - BackUp **12** - CVCF **13** - Bypass **14** - Bypass **15** - Bypass **16** - Bypass **17** - Bypass	Y
6	11	Faults	Faults		R	R		Y
6	12	Warnings	Warnings		R	R		Y
6	13	UPS Status (Comm)	UPS Status(Comm)		R	R		Y
6	25	Service Port Baud Rate	Srv Port Baud		R	R	**0** - 9600 **1** - 19200 **2** - 38400 **3** - 57600 **4** - 115200	Y
6	27	RMTI3 Port Baud Rate	RMTI3 Port Baud		R	R	0 - 9600	Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
							1 - 19200 **2** - 38400 **3** - 57600 **4** - 115200	
6	31	Change Security Level	Change Secu. Lvl		R/W	R/W		Y
6	32	Manage Admin PW	Manage Admin PW		-	R/W		Y
6	33	Reset Admin PW	Reset Admin PW		R/W	R/W	**0** - Nothing **1** - Reset	N
6	39	Enable Remote Eye to Control UPS	En REye UPS Ctl		-	R/W		N
6	41	Inverter Start	Inverter Start		R	R/W		Y
6	42	Remote Switch	Remote Bypass Switch		-	R/W		Y
6	67	Auto Transfer	AutoXfer		R	R/W	255 or **1** - Enable **0** - Disabled	Y
7	1	System Operation Time	System Op Time	Sec	R	R		Y
7	2	Inverter Op Time	Inverter Op Time	Sec	R	R		Y
7	23	Total Backups	Total Backups		R	R		Y
7	25	Total Faults	Total Faults		R	R		Y
7	27	Total Operations	Total Operations		R	R		Y
8	1	Display Firmware Version	DFW Ver		R	R	"**UXXYFVMMRRR**" **T** - Toshba UPS **XX** - 2 Alpha Numeric UPS Product Line (4200FA) **Y** - uC Projects (M - Main, S - Sub, **D** - Display) **FV** - Firmware Version **MM** - Major version **RRR** - Minor version Note: Only display can write. Others, read only.	Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
8	2	Display Firmware Built Date	DFW BDate		R	R	**Mmm DD, YYYY** (Ex. Jan 04, 2006 Automatically read by compiler) Note: Only display can write. Others, read only."	Y
8	3	Display Firmware Built Time	DFW BTime		R	R	**HH:MM:SS** (Ex. 18:45:45 Automatically read by compiler) Note: Only display can write. Others, read only."	Y
8	6	Display Backlight Status	Sblight		R	R	**0**: Off **1**: On"	N
8	7	Display Sleep Timer	TMRsleep	Min	R/W	R/W		N
8	8	Buzzer	Buzzer		R/W	R/W	**0**: Disable **1**: Full Enable"	N
8	9	Buzzer Status	Sbuzzer		R	R	**0**: Off **1**: Idle **2**: Alarm Sounding **3**: Alarm Silenced"	Y
8	11	Display Calibration	Cali Disp		R/W	R/W	**0** : Disabled **255** : Enabled Note: Only display can write. Others, read only."	N
8	21	User Interface Tone	UI Tone		R/W	R/W		N
8	25	Wled Blink @BK	Warning Led @BK		R/W	R/W	**0** - Enable **255** - Disable"	N
8	27	Expert Mode	Expert Mode		R/W	R/W	**0** - Enable **255** - Disable"	N
8	28	UI Tone Duration	UI Tone Duration	mS	R/W	R/W		N
8	50	RemotEye Installation Date	REye Ins Dat		R/W	R/W	**YYYYMMDD** Note: Only RemoteEye III can write. Others, read only."	Y

Blk	Item	Long Description	Short Description (Inside UPS)	Units	Permissions		Remark	RE III
					User	Admin		
8	51	RemotEye Version	REye Ver		R/W	R/W	Note: Only RemoteEye III can write. Others, read only.	Y
8	52	RemotEye IP Address	REye IP		R/W	R/W	Ex. “10.128.33.5” Cfg. Of RE parms can be done via re comm.port Note: Only RemoteEye III can write. Others, read only.”	Y
8	53	RemotEye Network Mask Address	REye Mask IP		R/W	R/W	Ex. “”255.0.0.0” Note: Only RemoteEye III can write. Others, read only.”	Y
8	54	RemotEye Gateway Address	REye Gway IP		R/W	R/W	Ex. “”10.128.33.1” Note: Only RemoteEye III can write. Others, read only.”	Y
8	55	RemotEye Installation Status	Sreye		R/W	R/W	Note: Only RemoteEye III can write. Others, read only.	Y
8	57	RemotEye Data Link Status	Sreye Datlink		R/W	R/W	**0**: Unknown **1**: Link Down **2**: Link Up Note: Only RemoteEye III can write. Others, read only.”	Y
8	58	RemotEye Network Link Status	Sreye Netlink		R/W	R/W	**0**: Unknown **1**: Link Down **2**: Link Up Note: Only RemoteEye III can write. Others, read only.”	Y

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